# METAL INDUSTRY

WITH WHICH ARE INCORPORATED

ALUMINUM WORLD — COPPER AND BRASS

BRASS FOUNDER and FINISHER

ELECTRO-PLATERS REVIEW

VOL. 30 NEW YORK, FEBRUARY, 1932 No. 2


# The Use of Non-Ferrous Metals by the Steam Railroads


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## Copper, Zinc, Tin, Lead, Aluminum and Nickel in Wide Use. Where These Metals Go and in What Quantities.*

THE principal non-ferrous metals used by the steam railroads are copper, zinc, lead, nickel and aluminum. They appear, of course, in a great variety of forms, such as nickel steels, bearing metals, Monel metal, bronzes, paints, etc., in addition to those uses where they are employed in the commercially pure state. In order to give some idea of the extent to which they are used, the simplest procedure will be to take up individually some of the most important.

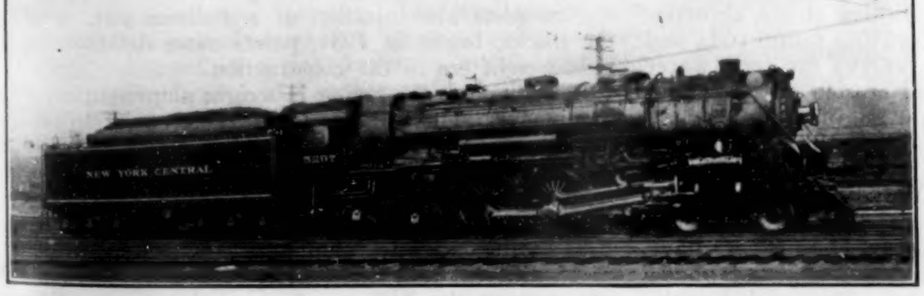
### Copper

According to the Copper and Brass Research Association the steam railroads of America had in use in 1929 about 750,000,000 pounds of copper, brass and bronze, with a yearly consumption of between 75 and 100 million pounds. In 1930 the amount used for new equipment amounted to somewhere around 17½ million pounds. The total of 750,000,000 pounds now in service may be broken down roughly as follows:

On locomotives there are 260,000,000 pounds of copper in use. It is used in commercially pure form or in alloys, as in piping and tubing for flue joints, for driving brasses and parts where there is wear, for pedestal shoes, bearings, rods, etc. The American Bureau of Metal Statistics has figured that the steam locomotives use about 3 pounds of copper per ton. As there are some 60,000 locomotives in operation in the United States it is not hard to see that the consumption is large even if the amount used on any one unit seems unimportant.

The same is true of the cars. There are some 2,400,000 freight cars averaging 100 pounds of copper each, occurring largely in the bronze backed journals and brass bushings of the air brakes. The average

*This is the second of a series of articles on Metals in Transportation. The first appeared in our issue for January, 1932.



HUDSON TYPE PASSENGER LOCOMOTIVE

The most notable advance in modern locomotive design is the new Hudson type. These new locomotives are specially built to New York Central specifications. Each costs $90,000 and is of more than 4,000 horsepower. A large amount of non-ferrous metal goes into the construction of such an engine.

Photo, New York Central Lines

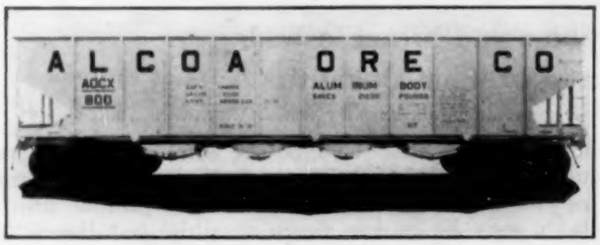
for freight cars of the most modern type is about 125 pounds of copper. The 62,000 Pullman cars and passenger cars total 83,000,000 pounds of copper for window sashes, ventilators, interior trim and water tanks, plus about 6,000,000 pounds for journal bearings and braking equipment.

Another interesting figure in connection with journal bearings, crown bushings and rod bearings is that about 30 pounds per million gross ton miles are used up. This is the amount which must be replaced due to wear. From this figure it is not hard for the railroad management to calculate the amount of copper it needs as soon as it knows the amount of business it has done or reasonably hopes to do. It is also a good guide for the producers of copper.

Copper is also used in large quantities by the steam railroads for the automatic signal systems which are operated electrically, for the electrified shops and power plants and for a variety of purposes in railroad buildings. The block signals account for about 25,000,000 pounds, the shops and power plants for about 40,000,000 pounds and the buildings for something like 20,000,000 pounds. To this should be added 75,000,000 pounds which have been used by the railroads for their private telephone and telegraph systems.

### Nickel

Nickel is used in many different ways, and these uses are being continually extended. In the first place




**AN ALUMINUM HOPPER CAR**

**The entire superstructure of this 70-ton hopper car is fabricated from aluminum plates and shapes. Net result, 21,200 pounds additional payload can be carried without exceeding the gross load of similar cars fabricated from heavier materials.**

the International Nickel Company has drawn up several standard specifications covering the use of nickel steels for locomotives and cars. They are the result of careful study and research, and show the effect of modern methods.

It is a matter of record that some 300 locomotives have nickel steel boilers and that 600 to 700 have nickel steel forgings. Also a great many have nickel steel castings. In addition, all locomotives have some nickel in the valves, superheater headers and bolts.

Monel metal is used for locomotive slides, throttles for high pressure steam, reciprocating pump rods and lines, valve springs, bolts, the valves for feed water pumps, etc., to prevent corrosion, erosion and abrasion. Bronze is being replaced on old engines in this way and the total amounts to something like 50,000 lbs. per year.

As regards passenger cars, Monel metal and stainless steel, containing nickel, are being used in the wash rooms and for water coolers. Dining cars have Monel metal tops for work tables, sinks and hoods over the stoves, all in the kitchens. Pure nickel cooking utensils are also largely used. The Monel sheets used for culinary purposes on the railroads amounts to about 40,000 lbs. a year. Club cars are equipped with nickel products in the galley. In refrigerating cars certain parts of the refrigerating machinery are made of nickel alloys, although this is just in its infancy at present. A very interesting application of pure nickel is for the interior lining of tank cars designed to carry caustic soda, used in large quantities by the rayon industry.

Unfortunately figures giving the total quantities of nickel used by the railroads of the country are not available but the foregoing recital of the wide diversity of uses will give some idea of its importance in this industry.

### Lead, Tin and Zinc

In 1930, 5,200 tons of lead were used in new railway equipment alone. In addition to this 20,000 tons of bearing metal and 27,000 tons of solder were reported separately; and undoubtedly a large portion went for replacement. The American Bureau of Metal Statistics says that the steam locomotives use about 28 lbs. of lead per ton, for the engine only, in working order. The amount of lead per freight car averages 80 lbs. and per passenger car 120 lbs. exclusive of batteries. About 15 lbs. of lead per million gross ton miles are consumed and disappear in bearings and bushings. In addition to this there is a very large amount of lead consumed in the lead paints used by the railroads, in the storage batteries and lead covered cables needed for all phases of electrical work both on the cars, for signaling, and telegraphic and telephonic communication. There does not seem to be any way of arriving at the totals for these latter items.

Locomotives use about 3 lbs. of tin and one pound of zinc per ton in the engine alone. The average amount of zinc used per freight car is about 3 lbs. and for passenger cars 200 lbs.

### Aluminum

The use of aluminum in the construction of steam railroad cars has progressed well beyond the experimental stage and the use of the strong alloys may be expected to increase materially on account of the great advantages of reducing the weights of cars. In passenger cars the application of aluminum has been chiefly in the superstructure, with a saving of from 8,000 to 12,000 pounds in dead weight. Tank cars having aluminum tanks and fittings, are being built with a saving of about 8,400 pounds per car, or 20 per cent in weight. Ten 70-ton hopper cars with aluminum superstructures have recently been built for use in transporting coal, sulphur and bauxite. These cars weigh 21,200 pounds less than similar cars fabricated from the heavier materials. Their performance is being carefully watched by the railroads throughout the country; while the complete aluminization of a Pullman car, including the trucks, begun in 1931, points more definitely to the light-weight era in car construction.

In addition to the saving in weight aluminum has other advantages. There is less tendency for paint to peel off the alloys used and they have a high degree of resistance to atmospheric corrosion. They also suffer less distortion from heavy blows and are easily worked.

In 1931 there were 778 passenger, tank and freight cars, having extensive aluminum applications, in service on 15 different railroads. This, of course, does not take into account the 748 cars in operation on 18 different electric railways.

# Protection of Aluminum by Anodic Treatment

By Dr. JOSEPH ROSSMAN
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## A Review of the Patents Covering This Process Which Has Attracted Such Wide Attention

MUCH attention has been recently given to the anodic treatment of aluminum and its alloys for producing superficial films of oxide on the metal for various purposes, such as for protection against corrosion, for electric insulation, for making electrodes, for condensers and rectifiers, for producing a surface on the aluminum which can be dyed or painted, etc.

It has been known for a long time that the bright surface of aluminum quickly tarnishes in the air on account of the formation of an oxide film on the surface. The films produced by exposure to the air are very thin and have little protective qualities for they are deficient in covering power and in adherence to the articles. Because of their lack of adherence they readily scale or break off from the metal, particularly when they are bent.

It was found that thick, protective, adherent oxide films could be produced on aluminum and its alloys by making it the anode in a suitable electrolyte. This expedient, for instance, has been used with great success in protecting aeroplane parts from corrosion.[1]

Quite a number of methods have been devised and patented for anodically treating aluminum in order to produce satisfactory coatings. These methods as disclosed in the patent literature will be described in this article.

### United States Patents

1. **L. W. Chubb**; 999,749 Aug. 8, 1911. Aluminum wire or strip is bent into an open helix and immersed as an electrode in a bath of sodium silicate, ammonium borate or other suitable liquid. After the helix is coated the convolutions are pressed together.

2. **Mershon**; 1,065,704 June 24, 1913. An aluminum cooking vessel is filled with a hot saturated solution of borax and connected to the positive pole of a source of current. The oxide coating prevents sticking of food. Boric and phosphoric acid may be added to the bath. The following bath is recommended: two gallons of saturated borax solution, three pounds of boric acid, and an additional half-pound of borax. Electrodes for condensers and rectifiers are made by the same process.

3. **Chubb**; 1,068,410 July 29, 1913. Thin aluminum wires are insulated by an oxide coating which is produced by a continuous process. The wire passes over sheaves into a bath of ammonium borate or sodium silicate solution contained in a tank having a metal lining, the sheaves being located in opposite ends of the tank and submerged in the solution. The tank and the electrolyte are electrically connected to a source of D. C. current so that a film is anodically produced on the wire as it passes through the bath.

4. **Chubb**; 1,068,411 July 29, 1913. Aluminum wire is continuously coated with an oxide film by first passing it through a tank containing a solution of potassium hydroxide in order to clean it and then through a tank of sodium silicate solution where it is electrically connected as an anode. The wire passes in a straight line through the tanks by means of glass tube connections between the tanks.

5. **Presser**; 1,117,240 Nov. 17, 1914. Aluminum wire is insulated by anodic treatment in a bath of sodium carbonate. The patent describes an apparatus for continuously coating the wire. Prior to anodic treatment it is cleaned and after the film is formed the wire is coated with oil or lacquer and then dried.

6. **Abernethy**; 1,323,236 Dec. 2, 1919. Aluminum coated copper wire is anodically treated in an aqueous solution of potassium permanganate and sulfuric acid.

7. **Flick**; 1,526,127 Feb. 10, 1925. Aluminum is provided with an oxide coating by anodic treatment in an electrolyte containing ammonia and ammonium sulphide. As a specific example, the electrolyte may contain one part of concentrated aqua ammonia to ten parts of water by volume. Preferably, however, it contains about one part of ammoniacal ammonium sulphide solution to ten parts of water by volume, the ammonium sulphide solution being made by the absorption of about fifty grams of hydrogen sulphide in one liter of concentrated aqua ammonia. Satisfactory coatings have been produced with a current density as low as three and as high as twenty-five or more amperes per square inch of the article being coated. The current density customarily used is so high that heating of the electrolyte solution cannot be avoided unless resort is had to artificial cooling. However, hot solutions have been found to be advantageous in the formation of coatings, the temperature preferably being from 30 degrees to 90 degrees C.

In carrying out the process, an article to be coated is first cleaned by immersing it in an aqueous solution containing hydrofluoric and nitric acids in proportions of from about two to five per cent by volume of the usual concentrated acid. The cleaned article is then made anode in an electrolytic cell containing an electrolyte such as explained. As an additional feature of the invention, it has been found that the coating produced by the process has a further unique characteristic, namely, that of being absorbent, which permits it being permanently dyed to produce a wide variety of colors. There are many dyes, usually acidic in nature, which combine with aluminum hydroxide to form an aluminum salt of the type known as a "lake." Such dyes may be combined with or absorbed on this oxide coating, either while the coating is being formed by adding a dye to the electrolyte, or after it is formed by immersing the coated article in a solution of a dye. For example, by using an ammonium sulphide solution as an electrolyte and adding to it from about 0.1 to 0.3 gram benzopurpurin per liter of the solution, the coating resulting from the process is a

[1]See W. Nelson, The Anodic Oxidation Treatment of Duralumin, *Aviation*, Vol. 22, p. 1288 (1927).

pleasing shade of red. The addition of a logwood extract to the electrolyte gives a blue coating, cochineal a pink coating, and other dyes various other colored coatings, it being understood that by the proper selection of suitable dyes almost any desired color of coating may be produced.

While it is generally preferred to add the dye to the electrolyte and thereby simultaneously coat and color the surface of an aluminum article, the color may, as indicated, be effected by immersing the article in a dye solution. This is found preferable in cases where the presence of a dye in an ammoniacal solution is not desirable. When the coating is effected by immersion, the combination of a dye with the oxide coating frequently may be facilitated by heating the dye solution from about 50 degrees to 80 degrees C.

**8. Kujirai;** 1,735,286 Nov. 12, 1929. This patent gives the following examples:

Example I.—Aqueous solution of 1.0 to 3.0 per cent of oxalic acid or its salts is used as the electrolyte. When alternating current is used for electrolysis both electrodes are made of metallic aluminum or aluminum alloys, such as duralumin. When direct current is used, the positive electrode is made of metallic aluminum or aluminum alloy, while the negative electrode may be metallic aluminum or any other conductor inactive to the electrolyte. In both cases the electrolysis should preferably be performed under the working voltage of 60 to 100 volts and the current density of 0.05 to 0.03 amperes per square centimeter. After electrolysis of about one hour, the surface of aluminum or its alloy is covered with the skin having yellow or gray enamel-like luster, which has electrically insulating and anti-corrosive properties. The thickness of the skin increases nearly proportionally to the quantity of electricity used for electrolysis.

Example II.—Aqueous solution of 1.0 to 3.0 per cent of malonic acid or its salts is used as the electrolyte under the similar condition and process of electrolysis as explained in the Example I, the surface of aluminum or its alloy is covered with the skin having gray enamel-like luster with insulating and anti-corrosive properties. In all cases, the temperature of the electrolyte should remain under 30 degrees C. Cooling and continuous agitation is recommended.

**9. Setoh et al;** 1,735,509 Nov. 12, 1929. The process of forming an electrically insulating and anti-corrosive oxide coating on aluminum comprises simultaneously electrolyzing an aqueous solution containing 1 to 3 per cent oxalic acid with alternating and direct current employing aluminum material as the positive electrode and electric conducting material as the negative electrode for the direct current.

**10. Bengough and Stuart;** 1,771,910 July 29, 1930. The object is first washed in a solvent for grease and then in hot water; it is then made the anode in a bath consisting of an aqueous solution of chromic acid of 3 per cent strength (the chromic acid being calculated as $CrO_3$), which should be free from sulphuric acid and sulphates. The cathode may be of carbon.

The immersed surface should consist entirely of aluminum or aluminum alloy, the electrical connections being made so that no other metal dips into the bath. If necessary the object may be partially immersed and treated and then inverted so that the remainder of the surface is now immersed and becomes treated.

The temperature of the bath is kept at 40 degrees C. at least and the bulk may be stirred during the treatment. The voltage must be carefully regulated to suit the other conditions; when the latter are those already named the following procedure has been found suitable:—Raise the voltage across the bath gradually to 40 volts in 15 minutes, keep at 40 volts for 35 minutes, and then raise the voltage to 50 volts in the course of 5 minutes and retain it at this value for 5 minutes. The object is then washed and dried.

The film or coating produced by this invention is highly uniform and thicker than those produced by other processes; hence the coated articles when completely immersed in such liquids as seawater resist pitting and other forms of attack for long periods.

The degree of resistance is greatly increased if the coated surface is greased or oiled, for the coating has great power of absorption and the grease becomes incorporated in the surface. For this reason the coated surface is well adapted for being painted since the oil of the paint becomes absorbed. Lanoline is a particularly suitable grease for treating the coated surface; it may be applied in liquid form, in solution or as an emulsion.

A description of laboratory and large scale experiments for anodically treating aluminum in 3 per cent chromic acid is given in the British bulletin entitled "The Anodic Oxidation of Aluminum and Its Alloys as a Protection Against Corrosion," published by the Department of Scientific and Industrial Research, London, His Majesty's Stationery Office, 1926.

**This article will be continued in an early issue.—Ed.**

## Anodic Treatment of Aluminum

Q.—In anodic treatment of duralumin and other aluminum alloys, we find that the work has a tendency to burn through at the point of contact in solution. The aluminum wires burn away where they make contact with the work in the solution, and the work is frequently burned through, showing holes and other defects where the contact has been made. We use heavy aluminum strip for the wires, the contacts are made tight, and the work is well insulated from the tank, but the trouble continues.

The solution we use is made up as follows: 300 lbs. chromic acid is dissolved in 1200 gal. water. It is used at 104° F., in an iron tank. The work is on the positive side and the tank is the negative. The current is increased from zero to 40 volts in 15 minutes, and is run 35 minutes at 40 volts. It is then raised to 50 volts in 5 minutes and run 5 minutes more at 50 volts. The total time in solution is thus 60 minutes. We use 500 amperes or less, according to the amount of work being treated. We have a generator which was especially built for the purpose.

We did not experience this trouble before newly making up the above solution. We formerly used a solution made according to the same formula. During the year we used it, it seldom gave the trouble we are now having.

Can you recommend some addition agent which will age the solution, or some other means of eliminating the burning?

A.—The trouble experienced is due to contact resistance caused by a loose contact or by not having a large enough cross section of wire to carry the current. If the contact is made above the solution, then the aluminum and the wire must be made clean; if below the solution and there is not a very close contact, the oxide formed will insulate the part being processed and cause a resistance which will result in heat. Use heavy wire and absolutely close, tight contact.

E. E.

# Degreasing Metals by the Vapor Process

By E. V. D. WALLACE
Carrier Engineering Company, Newark, N. J.

**A New Process for the Positive Removal of Heavy Oils and Greases—It Does Not Eliminate Plating Cleaners, But Makes Their Work Easier**

FROM THE MONTHLY REVIEW OF THE AMERICAN ELECTROPLATERS' SOCIETY, DECEMBER, 1931

IN a survey made of a large number of metal finishing establishments about two years ago, the electroplating industry stood out most prominently in my mind as the one in which very little progress had been made, up to a short time ago. To me it seemed that the process was pretty well fixed and it had an air of mystery about it. The various methods in use were handed down from father to son, until you could almost read, when you went into an electroplating room, "Keep your hands off."

It is very evident now, however, in going into some of the larger and more modern plants, particularly those which are controlled by a graduate chemist, or possibly a younger man, that there are signs of improvement, and I believe that today the electroplating field is on the threshold of modern business and technical methods.

My observations were entirely those of an unbiased person, but in talking with the various men interested in the metal cleaning industry, it was generally agreed by all of them that the necessity for removing grease and oil from metals prior to any finishing method was paramount, and unless this could be done satisfactorily it was useless to expect a decent job of metal finishing. This led us to believe that our vapor degreasing process would be the key to better finishing, and so reported to our company, which was interested in putting out the Carrier Vapor Degreasing Process.

#### Origin of the Vapor Process

Some years ago, when the automobile industry attempted to invade the European market, most of the automobile parts, such as bodies, fenders, etc., were shipped to the foreign market thoroughly slushed in oil. It then became a difficult proposition to remove this oil and grease from these parts, prior to enameling. It was through the ingenuity of the Carrier, Ltd., engineers that a method of putting these parts through vapor, created by the boiling or evaporation of chlorinated solvents, by which this grease and oil could be removed most effectively without a tremendous amount of hand scrubbing with gasoline or other solvents. Several of these installations were made in England, Belgium and Brazil, and worked out so satisfactorily that it was thought advisable to bring the proposition to this country and see if it could not be developed to a point where it would be acceptable to the metal cleaning industry here.

Chlorinated solvents are used quite extensively in Europe as a means of removing grease and oil, but they are used in the liquid form, just as we use gasoline, naphtha, spirits and lacquer thinners. Most of these solvents are non-inflammable and non-explosive, and are a by-product instead of being a manufactured product as in this country. They are cheaper to use there, in view of the fact that they are a by-product, and therefore gasoline and naphtha are not used to such an extent.

The vapor process had never been used in this country before, although it was generally known among chemists for the past hundred years that the vapor from chlorinated solvents was most effective in the removal of grease and oil from metal. Therefore, it was necessary for us to put the problem in our own laboratory and work out the best means of evaporating the liquid, controlling the vapor, and calculating the various ratios necessary to make the proposition the most attractive one for the manufacturers here, it being borne in mind that we had our eye on the automobile manufacturing business, as that was where our experience lay abroad.

During the course of our development work we hit upon a very clever idea of controlling this vapor by means of condenser coils. Since the vapor was several times heavier than air, it would lie in a tank the same as water.

We found, from our previous survey of the metal industry, that there is a very large field throughout the country for the use of a positive grease remover, and this stimulated our efforts toward the development of our present Carrier vapor dip tank.

#### Description of the Vapor Degreasing Process

This consists of boiling or evaporating in a tank, or container, a solvent for grease and oil in which the metal or material to be degreased is immersed in the vapor arising from this boiling liquid. As the metal is colder than the vapor, the vapor immediately condenses upon the surface, absorbing the grease and oil and running off, carrying with it the dissolved grease and a considerable amount of the insoluble material. The key to this method is that the degreased surface does not come in contact with the oil or grease when being removed from the tank or container. In other words, only the pure solvents ever come in contact with the degreased surface and, therefore, this method is a positive one and not at all dependent upon the operator.

In the design of this equipment, it became necessary to control the surplus vapor from rising above the top of the tank, and this was done by means of condenser coils placed at the vapor level, through which cold water ran

and over which the vapor would condense and flow back to the liquid well. The means of evaporation is simple, and can be accomplished by either steam or electricity and, in some cases, gas, providing the diffusion of the vapor does not come in contact with the gas flame.

We found, by a considerable amount of experimental work, that the liquid which we have termed Cecolene No. 1, and known chemically in the market as Trichlorethylene, is the most suitable of all the chlorinated solvents for use in this process.

There is a certain amount of diffusion when the vapor comes in contact with the air, but it was found that this diffusion was less with this liquid than any of the others, and, in spite of the price, was cheaper in the long run, it being borne in mind that this liquid boils at 188°, which is slightly below that of water. It is non-inflammable and non-explosive, so it is almost an ideal liquid to use for this purpose.

The corrosive qualities of this vapor, and particularly when in contact with moisture, made it imperative for us to investigate the material to be used in these tanks quite extensively. Up to the present time, copper has been found to be most suitable for this work. Therefore, our present standard dip tank is built of a copper shell, thoroughly insulated, and covered with galvanized sheet iron as a means of protection. The whole tank is slung in a structural steel frame and is free to expand with temperature changes.

While we show covers on these tanks, they are not required, in view of the fact that the condenser coils hold the vapor at a definite level, and only a mild diffusion of the vapor with the air comes out of the tank.

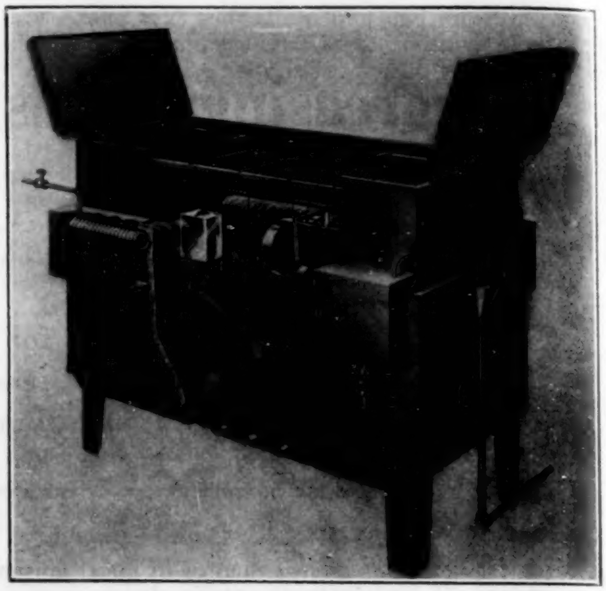
It has occasionally been brought up that this liquid, or vapor, is toxic; so are alcohol, lacquer thinners and various fumes arising from certain processes which may be found in any factory. Certainly a human being is not going to stick his head into this vapor any more than he would put his hand into hot water. We have found from very close observation, and a considerable amount of experimental work, that if the operator keeps his nose eighteen inches above the vapor level, he need not worry about toxicity or harmful effects.

Of course, it is our recommendation that these machines be placed in large, open rooms, or in rooms in which the ventilation is obtained near the floor level, as this diffused vapor drops to the floor immediately.

The length of time required to degrease an object in the Cecolene vapor is variable, but on close observation one will notice that the degreasing is done in the first twenty seconds that the object is in the vapor; after that it is necessary to leave the metal immersed until it comes up to the temperature of the vapor, which may be from thirty seconds to one or two minutes. This is necessary to prevent the liquid being withdrawn with the metal from the vapor, and reduces the loss to a minimum.

In putting this process on the market we, of course, expected to enter the automobile field, but owing to the depression in business we found other fields more lucrative for the time being. This process has found its way into fifteen (15) different fields of manufacture.

We thought at first the electroplating field was very attractive, but when it was found that the process did not eliminate any of the previous baths that are generally used in electroplating, we quickly gave up the idea and turned our efforts toward other lines. However, it was not long before some of these machines found their way into electroplating plants, and while it was observed that this process does not eliminate any of the previous baths, it does eliminate the grease and oil before the electroplating process, as stated. This keeps the various alkalines, acids and electroplating baths from being contaminated with



**Carrier Vapor Degreaser.**

grease and oil, maintains their proper concentration, and makes the whole electroplating process practically foolproof, which is a thing that is greatly desired. We are now glad to say that we have a large number of electroplating plants using our degreasing process, and while we do not claim to be competitors of any of the cleaning compound manufacturers, we have found that this process, used in conjunction with theirs, cuts down their service troubles tremendously.

There are a few instances in which the degreaser has supplanted the alkaline solutions, but these are so few and far between that they are hardly worth considering. The application of the degreaser is more or less up to the operator to get the most out of it in connection with his own particular problems, and many have found that an electric cleaner directly after the degreaser makes an ideal combination for the electroplater.

These machines are not only built in the standard size, but have also been built with much larger dimensions and suitable for either the manually operated dip machine or for the conveyor type.

### Cost of Operation

Another thing brought out by our survey of the metal cleaning industry is quite significant, and that is the actual cost of cleaning metal, either on the pound basis or on the square foot basis. There seems to be a great mystery about this, as very few have worked out their cleaning costs. With the vapor process, one can very easily determine the cost of degreasing. It is made up of four items: the cost of replacing the liquid, the cost of heating the liquid, the water consumption, and the cost of labor. From our observation it would appear that the present method of degreasing runs from $4.00 per ton on up. We have installations of the conveyor type on which the total cost is as low as $1.00 per ton, but for the average metal industry we believe this cost would run between $3.00 and $3.50 per ton, depending entirely upon how fast the degreaser is operated. At any rate our observations and records show that where the positive degreasing of a product is paramount, the vapor process turns out to be about the quickest and cheapest method that can be used.

Aside from the electroplating industry, there are some wide fields for the use of a positive grease remover. One can visualize the enormous field in the metal furniture

game, in the repair of automobiles and automobile service trucks, the removal of oil from production machines which contaminates the product, the removal of oil from metal prior to acid etching, the removal of oil between stamping operations in any of the large production plants manufacturing metal ware, etc.

We have had some rather odd applications of the vapor degreaser which may be of interest to you, such as the removal of grease from cafeteria trays, the removal of wax from hypodermic syringes, oil from rifle barrels, and oil from clocks and watch works, typewriters and adding machines in the assembled state, and also excess oil from leather belting.

There are also some interesting limitations of the vapor degreaser in which the vapor will not remove the grease and oil from the metals. These are usually cases where the metal is so thin or so light in weight as to come up to the temperature of the vapor almost immediately upon immersion. These are represented by gold foil, tin foil, closely woven jewelry, and some intricate machine parts which are very light; also the grids on radio tubes. We have, however, been able to treat these parts very satisfactorily by combinations of the liquid and vapor.

**Discussion**

**E. F. Lewis:** Are there any conditions under which the vapor will tarnish or stain the finished metal?

**Mr. Wallace:** No. Unless there is water present in the vapor. Occasionally, in polished brass, water in the vapor will stain it.

**Mr. Whitehead:** What is the initial cost of an installation? What does it range from?

**Mr. Wallace:** This process has developed into quite an engineering business, and the fundamental of design is based entirely upon the pounds or tons of metal to be degreased per hour, dropped down to pounds to be degreased per minute, from which we have to go to twenty seconds, because the degreasing action is all done in about the first twenty seconds. Thus, to give you a cost of any installation, I would have to know your production first.

**Mr. Whitehead:** Well, say on a thousand pounds an hour.

**Mr. Wallace:** Would that be conveyor type or manually operated?

**Mr. Whitehead:** Manual.

**Mr. Wallace:** About $600 I might say, in connection with this, that the vapor process is extremely fast. We thought when we started out with this that we would have to increase the size of our tanks, but we soon found that our customers were degreasing upwards of a thousand pounds of metal per hour in a small dip tank, 21 in. wide and 48 in. long, and in some cases they are running the tanks twenty-four hours a day. In some cases they have increased the number of spray booths to take the capacity of the tank, which seems to be great for its size.

**Mr. Albert Hirsch:** Isn't that trichlorethylene very expensive, and on a small production basis wouldn't the cost be much higher than what you stated?

**Mr. Wallace:** It is very expensive as far as chemicals go, about $1.35 per gallon, and in large quantities it can be bought as low as $1.22. But that cost per gallon does not seem to enter into the game as much as we thought it would, on account of our ability to design the tank and the equipment to cut down the diffusion loss. The diffusion loss from this vapor is at the rate of .046 of a pound per square foot of vapor surface in contact with the air per hour.

**Mr. Hirsch:** Couldn't that be reasoned out another way—the cost of the charge in there, and how long that charge would last?

**Mr. Wallace:** Not very well. In our standard tank, which I said was 21 in. wide and 48 in. long, in which you can put through a thousand pounds per hour, you will have a loss of about three gallons of that liquid in eight to nine hours' time, in average operation.

**Mr. Hutchinson:** I might say that we used one of those degreasers the past year and a half or two years. I might mention one particular use we used it for, and that is cleaning grease from parts that have been pickled, of vitreous enamel. That would hardly seem possible, but the machine does that work. We find that steel parts which are not finished up in the next two or three days will rust. Have you found that to be the case with steel parts allowed to remain in stock a few days or weeks before finishing?

**Mr. Wallace:** Personally, I believe the finishing of metal ought to be done immediately after it is degreased; but I do know of a number of cases in which the metal had not rusted for a long time after, say five or six weeks after it has come out of the vapor bath.

**Mr. C. P. Kuell:** About two years ago we tried your method on buffed work, nickel-plated work ready for packing. We found it quite a job cleaning off such parts as embossed work, and we thought that it might be a good idea to use your degreasing process for cleaning off this greasy buffed material. But after using it, putting it through your outfit, there seemed to remain a dry film. Also, the dirt was not removed with the grease; it seemed to remain. Have you been able to produce anything in that line?

**Mr. Wallace:** Of course we advertise that this is just a positive grease remover; that is all it will remove, grease and oil, any of the oils, with the exception of the water soluble oils. The dust is left on there in the form of residue. It comes off very easily. But in some cases our customers have been able to remove that by first flushing the part in cold liquid, cold trichlorethylene. First put it in the vapor and then slush it in the cold liquid, and then back in the vapor again to dry, and in some cases all that dust has been removed very satisfactorily.

**Mr. Kuell:** And the work has been fit to ship in that condition?

**Mr. Wallace:** Yes, but I won't say it will do it every time. We can only guarantee to take the grease off. But as I say, our customers have put the machine to very, very strange uses. In some cases we are not even allowed to find out just how they have worked out their difficulties, but it has been a godsend to many concerns.

## Purifying Lead

Q.—With refernce to the article on "Separating Copper and Lead," page 446, issue of October, will you please advise whether the metal noted would be suitable for removing traces of copper below 0.15% from lead. We have been making some runs along these lines and have used both sulphur and soda, but have not been able to get the percentage of copper below 0.15%.

A.—We have found considerable trouble in removing copper from lead below 0.15%. However, it can be done.

In addition to using sulphur and soda and lime, we found by covering the metal with litharge after boiling and then lowering the heat so that the litharge cakes over and forms a crust, that after removing the crust the copper will be lowered to 0.10 and possibly 0.05%.

However, you will find your loss in smelting will run higher. This process is used when you have removed the copper down to approximately 0.15 per cent and you want a lower copper content. W. J. R.

# Some Notes on Soldering Fluxes

By A. EYLES

IN order that metals soldered together may be securely held there must be more than mere adhesion between the solder and the metal. An alloy must be formed between the metal and the solder. In order that this alloy may be formed the surface of the metal must be entirely free from any foreign substance such as oxide, oil or other matter. Since it is not always convenient to mechanically clean the areas to be soldered, we resort to the use of various chemicals to clean the surfaces.

There are many soldering fluxes in practical use, and each has its peculiar advantages and disadvantages. Soldering fluxes should not be used indiscriminately but should be determined by the nature of the work. If brass, copper or tin plate is to be soldered, the common fluxes, as zinc chloride, rosin or ammonium chloride, may be used; for zinc or galvanized steel products muriatic acid is a suitable flux. The rapidity with which a soldering flux acts is an important factor in its usefulness. If the flux be in the form of a dry salt, a comparatively high heat is necessary to fuse it. If an aqueous solution be used a certain amount of heat is essential to evaporate the moisture. The function of a soldering flux is to have a solvent action on the oxide, thereby keeping the metal surface clean and excluding the air.

Zinc chloride has several properties which make it a valuable soldering flux for many metal jointing jobs. It remains liquid at the temperature of molten solder, thus being in a condition to act upon the oxides very readily. Some metal workers add a quantity of water to zinc chloride flux, but in the writer's opinion it is detrimental, because the stronger the flux can be made and still remain liquid, the better it will be. The water also has the disadvantage of producing spattering.

Generally, soldering fluxes are divided into two classes —(a) those preventing the oxidization of a clean or bright metallic surface during soldering; and (b) those which actually act as cleaning agents. Examples of class (a) are rosin, tallow, palm oil, glycerine, etc., examples of class (b) are zinc chloride, muriatic acid, and ammonium chloride.

Rosin, either as a powder or an alcoholic solution, is an excellent soldering flux where speed is not required. But it has the undesirable property of leaving a sticky, gummy mass on the metal surface after the evaporation of the alcohol, which is a hindrance in many kinds of metal work. It is, however, an ideal flux to employ where a non-poisonous flux is desired. It is also an excellent flux for soldering operations on electrical conductors, as it is practically free from acid, and is a fair insulator.

It would be difficult to mention what has not been tried as a soldering flux for aluminum, and it may be safely said that no soft soldering flux has yet been discovered that will allow the metal, or even its alloys, to be soldered with the same speed and reliability as ordinary commercial soldering fluxes operate on brass, copper, and tin plate.

What is needed for soft soldering aluminum is a flux that would rapidly dissolve the oxide film and combine with the alumina to produce a compound that would remain liquid during the soldering operation and counteract the effect of the oxide, allowing the solder to alloy with the metal thoroughly. Fusion of the oxide is completely out of the question in soft soldering as its melting point is too high (approximately 3000° C.). Stearin and tallow have given fair results as fluxes, but the writer's experience is that after preliminary cleaning and tinning of the areas to be soldered, solders are best applied without a flux.

For hard soldering or brazing, borax is the best and most reliable flux, as it dissolves any oxide that may exist on the surface of the metal and protects it from the air, thus allowing the solder to come in actual contact with the metal.

Preferably calcined (fused) borax in powdered form should be used as it will not swell or froth up. Powdered borax fused and mixed to a paste with alcohol is also an excellent flux for hard soldering. This flux must be kept in a closed container when not actually in use, so as to prevent evaporation.

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# Alloy for Grave Markers

Q.—We should like some information on a metal that will polish and leave a bright finish; one that will not corrode or tarnish, that will withstand all weather conditions and that may be guaranteed. We wish to use this metal for grave markers which are to be molded in sand moulds, as we have our own foundry and plant. The size of the marker is 12" by 24" and weighs about 40 lbs.

A.—The alloy that is used for that purpose is composed of: 2 to 3% zinc; 6½% tin; 1½% lead; balance copper. This alloy must be made under the supervision of someone who understands alloying, and **only vigrin metal can be used.**

Put all the copper in the crucible and cover with charcoal and borax. Do not let any of the metal stick out of the crucible. When melted, add the lead. Stir and add the zinc, then the tin. Pour at 2,000 to 2,150 deg. F. Use a pyrometer to check the pouring temperature. Also add a handful of salt just as soon as the metal is melted.

This alloy casts well and possesses the proper stiffness and color, runs free and thin, and if alloyed properly will in time turn green—the color so much desired by grave markers. If you want to keep a bright finish for about one year, we suggest that you give the markers two coats of clear lacquer, the first a little heavy and the second one light.

W. J. Reardon

# Salt Cellars — Old and New

By A. F. SAUNDERS

Designer, Benedict Manufacturing Company, East Syracuse, N. Y.

## An Article in Two Parts on the Artistic Development of a Very Old, and at One Time, Very Important Table Utensil.—Part 2*

### Salts from the 18th Century to the Present Time

ASIDE from the general utility of salt, and apart from the scruples with regard to spilling it, salt was regarded with profoundly superstitious feelings. It was considered desirable that it should be the first article placed on the table after the cloth was laid. Little wonder then, that an article of such importance should attract the artistic skill of the best craftsmen in the making of suitable containers for its use on the table.

The magnificent gold and enamel salt cellar made for Francis I by the famous goldsmith Cellini, is an outstanding example of the lavishness in decorative design bestowed upon such articles as long ago as the 16th century. The earliest salt cellars of American make followed closely in size and general design, the styles developed in England during the 17th century, and for the most part these salts were copies of the small "trencher" salts, so called from their always being placed beside the "trencher" (a large plate) during meal time.

The exact origin of the "trencher" salt is rather uncertain to establish as very few made prior to the time of Charles II (1660-1685) are extant. In size they varied from 1½ to 3½ inches in height, and approximated three to three and a half inches in diameter, although larger sizes of this type were made in England during the Elizabethan period (1559-1603).

Trencher salts were made in a variety of shapes, round, oval, triangular, hexagonal, octagonal and quatrefoil. The earlier styles were either perfectly plain or decorated in a simple manner with flutings, gadroonings, or knurling. By the middle of the 18th century, more ornate patterns came into fashion, following in design the decorative features of the Georgian styles developed approximately between 1714 and 1800.

Engraving, repoussé, chasing, and piercing became the vogue. Those decorated with piercing were fitted with colored glass linings, though judging from the examples of these pierced salts extant, but few if any of this style seems to have been made in the American Colonies. Probably for the reason that similar less expensive salts of Sheffield plate found a ready sale there.

Plate 3 illustrates some of the styles in trencher salts, most favored by the New England Silversmiths in Colonial times. Fig. 1 pictures one of a pair of oval trencher salts made in London during the time of Queen Anne, the design is severely plain, and it is interesting to note that a similar pair made by John Burt (1691-1745) is owned by a descendant of this celebrated Boston Silversmith. Fig. 2 is a circular trencher salt of substantially the same period, but decorated with a spiral fluting similar to the border on contemporary articles of table service. This salt is one of a pair made by another celebrated Colonial Silversmith, John Coney (1655-1722).

Another popular type of salt cellar of English Origin much copied in Colonial America, and best known as a tripod salt, has a rounded bottom circular body, resting

*Part I was published in our issue for August, 1931.


Plate 3.—Salt Cellars of the Types Favored by Colonial Silversmiths of New England.


**Plate 4.—Group 1, Open and Shaker Types of Salt Cellars. Group 2, Modern Designs.**

on three curved shell or claw feet, with the rim richly gadrooned and everted. Fig. 3 illustrates one of a pair of tripod design, made in 1764.

Pierced salts with colored glass linings came into fashion in England about the middle of the 18th century. They were made in a great variety of patterns, the colored glass, usually dark blue or ruby, showing through the delicate pierced design, in a most attractive manner, sometimes sections of the piercing would be overlaid with chased rosettes, and festoons following the decorative style of the furniture made by Robert Adam. Many of these pierced salts were further enriched by gilding, which, with the coloring of the glass contributed greatly to the beauty of the table setting. Fig. 4 illustrates a pierced salt made in London, bearing the Hall mark of 1766-7.

Boat shaped salts with slender curved looped handles (Fig. 6), became popular in England and America about the end of the 18th century, sometimes the handles were in the form of rings suspended from Volutes (scrolls), or from the jaws of lion heads, thus matching the larger pieces of the service, such as tureens, etc.

Salt shakers, or casters as they were formerly called, received their name from the act of "casting" or "shaking" salt from the receptacle; hence the tops were pierced for that purpose. As separate articles of tableware they did not appear in England until the end of the 17th century. Larger forms soon followed under the name of dredgers or muffineers, and were (and still are) used for sifting sugar on foods at the table. The convenience of this style of salt container gradually became so manifest—that—by the middle of the 19th century, practically all table salts had become the shaker type.

The earliest form of casters were cylindrical, ranging in height from three to seven inches, some of which were fitted with a side handle. The dome shaped tops being pierced in intricate designs, usually forming a geometric design, of times with the plain surfaces between the perforations chased or engraved in delicate tracery. The more elaborate casters of middle 18th century make were chased or engraved in a most decorative manner, the body becoming vase shaped, sometimes fluted either hexagonal or octagonal, and decroated in the style of the Rococo period. (French Louis XV.) Figs. 8 and 9 illustrate two casters of this period made by Paul Revere, celebrated New England Silversmith, between 1735 and 1800. Fig. 10 is a modern reproduction of a dutch silver caster in the Rococo style. Our so-called modern salt shakers, those made during the past forty or fifty years, have, with certain modifications, followed the style of those of earlier days, in design they run the gamut from the simplest of fundamental body forms to the most elaborate of decorative effects, matching closely in general design the other articles of table service, with which they are to be used.

However, in spite of the popularity of the shaker type of salts, the small open salt cellars are still made, and group 1, Plate 4, illustrates some of the most favored forms as made in England and America at the present time. Group 2 shows some of the best modern designs.

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## Butler Finish

Q.—Will you please publish at your early convenience information as to the brushes, abrasives and speed best employed to produce a soft white Butler finish on sterling silver hollow ware?

A.—The character of a brushed silver finish will depend greatly upon the kind of wheel used and the speed at which the wheel is operated. The heavier the wire, the coarser the finish produced. Would suggest that you try a 6 row, 4 inch, crimped nickel silver wire wheel made of .002 wire and operate at 800 R.P.M. If the finish is too fine, apply a small quantity of F. F. pumice stone moistened with water to the work before wet-scratch brushing. If the finish is too dull, then repeat the scratch brush operation without the use of the pumice stone. A little experimenting along these lines will produce the results desired. O. J. S.

# Preparation of Steel Prior to Electroplating

By GEORGE B. HOGABOOM
Hanson-Van Winkle-Munning Company, Matawan, N. J.

## The Need for Adequate Preparation—Cleaning and Pickling Methods With and Without Electric Current Are Described

A PAPER READ AT EDUCATIONAL SESSION, PHILADELPHIA BRANCH A. E. S. ANNUAL MEETING NOV. 21, 1931, AND PUBLISHED IN THE MONTHLY REVIEW FOR JANUARY, 1932

IT IS within the memory of those here today that a definite program for studying the problem of finishing and electroplating metals was begun. Previous to this time, each plater seemingly stood alone and fought his way out of difficulties the best he could. When the problem defied all his efforts, and this was not until an untold amount of work was done and along with it the toll-taking worry, the cause was laid to something that could not be controlled and the attendant losses had to be accepted. This something was nearly always considered to be in the plating solution. It is no wonder then that the first definite efforts to help the plater with his problems were along the lines of the control of the plating solution. This was hailed as a great step forward, in fact, the only real movement that had ever been started that would bring out concrete facts which when properly assembled would indicate the direction for the plater to travel so as to get out of the woods of discouraging difficulties.

#### Research Into Plating Difficulties

The first effort toward this was the bringing of platers together where the problems could be discussed and help obtained from the experience of others. The American Electroplaters' Society has in its short life, done more for the plating industry than could have been done through any other channel. Any scientific organization would have been a failure. It could not have reached the men who gave the very best part of their lives, not alone to earning a living for themselves and their dependents, but to the development of their accepted vocation—finishing and electroplating. With all the difficulties ever present they turned out work of a character and quality that demands today the unqualified admiration of research engineers, members of scientific organizations, who now have become interested in the art of electroplating.

The need of some means to bring about a better comprehension of electroplating problems and to create a closer understanding between manufacturers of materials that entered into electroplating processes was emphasized in the beginning of the World War. Engineers looked upon electroplating methods in the same way that they viewed some mechanical process and drew up specifications which were not understandable to the plater and which were not possible to meet. This situation resulted in a conference at the U. S. Bureau of Standards and was the means of interesting that bureau in the problems of the plater. What has been accomplished by Dr. William Blum and his associates since that time is too well known and appreciated to need any comment before a meeting of platers. The one outstanding feature, however, that deserves mention is that the late Dr. S. W. Stratton, then Chief of the Bureau, and Dr. Blum, instead of bringing together a number of scientific men turned for assistance to the American Electroplaters' Society, to the men who were broad enough to get together and discuss their problems. This association of the Bureau and of the American Electroplaters' Society has become closer each year; at first general problems were looked into, then specific problems and the constitution and control of plating solutions were studied; research associates supported by the American Electroplaters' Society going still further into the principles upon which electroplating is based, are now a part of the work, and they not only should be, but must be loyally supported.

Industry, which had looked so often with closed eyes upon electroplating troubles, also became aware that if the same amount of directed effort were put into their electroplating processes as was put into their mechanical ones that their product would be improved and their costs decreased. In many plants the plating room was taken from the cellar and placed on the top floor. More attention was given to equipment and to control of plating solutions. Today, the electrodeposits are being intensively investigated so as to learn what influence a metal plated under controlled conditions, both chemical and electrical, has upon the desired protection from corrosion.

#### Need for Properly Prepared Base Metal

It seemed strange in all this work that the investigations should have been from the top to the bottom. Yet, how could it have been done otherwise? Without fully realizing it, those who directed or actually did the work were building a foundation with the superstructure. Had the metal to be processed been studied in the beginning, there would have been no way by which it could be definitely stated that the quality of the work obtained was attributable to the base metal, its preparation, or to the plating operations. The latter are now generally known and controlled. The effect of composition of the solution, the ratio content of the several ingredients, temperature, current density, and the time of deposit are fairly well established. The preparation of the work and its effect upon any or all of the known factors can now be more intelligently studied, and that should be the next problem. We know too little about it; and until it is under-

stood, any deduction drawn from the data obtained from methods used or from products obtained will have to be taken without the assurance that better results could not have been had if the effect of the character of the metal receiving the deposit and the preparation of the surface had been known.

You recall the discussion of Walter Fraine and Clarence Van Derau on my paper presented at the Detroit convention. It is not necessary to comment upon what was said regarding the trouble experienced with cold rolled steel, but attention may well be called to the most important point, that the physical character of the steel had a direct bearing upon the quality of the deposit obtained. The plater, no matter how ingenious he may be or how well he controls the plating solutions, cannot cover imperfections in steel stock that are due to the method of manufacture. The economy in fabrication of this grade of steel when it is to be electroplated is offset by the increased cost of finishing and plating, and at best the completed article bears the stamp of inferiority.

The physical condition of the stock is not all that the plater has to contend with, especially if the steel is to be plated directly after forming, that is, without any polishing operation. There is the material put on the steel to prevent it from corrosion. It is generally referred to as an oil, but often it is a residue of some process in the oil industry. It seems at times as if all the active qualities of this oil have been taken out as it resists emulsifying and can only be removed by wetting it with kerosene, diluting it with benzine or gasoline, or exposing it to the hot vapors of a solvent that leaves the solids on the work. After any of these treatments, alkali solutions must be used and followed by an acid pickle. What a help it would be to plating industry if there were a cooperative research by manufacturers of steel, fabricators of metal, and electroplaters!

### Cleaners for Steel

It is well not to attempt to remove a coating with a caustic alkali which had been put on by the steel mill to protect the steel from rusting. If the cleaning solution is violently boiled, or when an electric cleaner is used at pressure of 12 volts, the oil is forced from the surface of the steel and collects on the top of the cleaning solution. Soaps or other emulsifying agents are often added to caustic alkali cleaners with the hope that there will be a double action—the emulsification of the mineral oils by the soap and the removal of the emulsified material by the caustic alkali. In many cases this will be found to be good practice, but if much soap is present, such a cleaner cannot be used as an electric cleaner. The suds formed will hold the hydrogen gas developed; and if there is an electric spark, an explosion will take place. At times the explosion may be so violent that the cleaning solution will be forced out of the tank—a very dangerous method to use. The best practice is to use the two-cleaner method: a soap solution to emulsify the mineral oils and to remove the majority of the greases or compounds, and a caustic alkali bath used either as immersion or with the current as an electric cleaner.

Steel is cleaned better in an electric cleaner. A direct current should be used, but this may be followed by a few moments of reverse current. Both the direct and the reverse current should not be used in the same solution. It is known that at times this is done but the practice is not good and cannot be recommended. If there are products in the compounds used to protect or polish the steel that are soluble in a caustic bath, they will readily go into solution when the reverse current is used and will deposit upon the work with the direct current. Many compounds that are not chemically soluble in a cleaner are electro-chemically attacked and go into solution. Another source of often invisible difficulty is the presence of colloids in the cleaner. Under certain conditions, and these conditions often exist in a cleaning solution, colloids are deposited upon the work. They are generally of a gelatinous nature and are not easily detected. If strong acids are not used to remove the deposit of colloids, they will adhere to the work; and many cases have been seen where pitting and rough deposits were directly traceable to them.

If solid particles adhere to the work after the oils and greases have been removed, they may be removed by the use of a reverse current. This, however, should be done in a separate cleaning solution. It is a safety factor that often prevents much trouble which is difficult to locate. At times there is so much heavy material on the work that the cleaning methods, even when functioning well, fail to completely remove. Gasoline or benzine is resorted to, but this should be avoided wherever possible. It has been found that kerosene oil will thoroughly wet these heavy materials and even remove some of them. Kerosene is easily emulsified in a soap solution, especially if the work is agitated, and therefore much labor and expense can be saved if it is used just previous to the soap soak. There need be no rinsing after the kerosene oil dip. While there are no definite data to prove it there is every evidence that the presence of kerosene oil in a soap soak improves it and assists in decreasing the cleaning time. It is also known that what is left on the work after it comes from such a soap soak is readily removed in the electric cleaner. A hot water rinse should follow any cleaner in which soap is used or in which a soap is formed by the greases removed and the cleaning compounds. Cold water will congeal a soap film on the work and when put into an acid pickle, an insoluble soap film will be formed. Such a film is difficult to remove in an alkali cleaner; and if the work is rinsed in cold water alone after the acid pickle, there is the probability that the metal deposited will not have a good bond to the base. One of the distinct advantages of a hot cyanide copper deposit on steel previous to the nickel is not that the nickel adheres better to the copper but because the hot copper cyanide solution has acted as an electric cleaner and plater and removed films that have been often unknowingly left on the work.

### Acid Pickling After Cleaning

The acid pickling of steel after alkali cleaning is a most important process and one to which too little attention has been given by the plater. Sulphuric acid, hydrochloric acid or sometimes nitric acid is used in varying strengths. The control of the strength of the acids is almost an unknown procedure. Work covered with an alkali film is swished through a rinse water, rushed through a pickle, again rinsed in the same water as used for alkali rinsing, and hung in the plating solution. How long is the acid pickle really effective? The plating solution is carefully controlled by analysis; the alkali cleaners must be magical in their power to remove greases or oils, and yet, so often, the very process that will do more than any of the other preparatory cleaning methods is run strictly on a rule of thumb basis. Work from which all grease or oil has not been removed will not plate well; the deposit will not be adherent. Work that is not properly pickled may have a seemingly adherent plate, but there is no bond between the deposit and the base metal. Today, with the insistent demand for better electroplated

coatings that will afford a reasonable degree of protection against corrosion, there must be a good bond, in fact, a bond as perfect as possible to obtain. When chromium plating recently was accepted as a finish, the plater was surprised to learn that he was not obtaining a bond of the electroplated nickel—there was peeling when chromium was applied. With all its success as an ornamental coating, chromium would have been a failure if the plater had not learned how to bond the nickel deposit to the base metal. All of you know too well the vast number of failures that occurred in the early days of chromium plating, and were these not due to the lack of knowledge of how to prepare the base metal? When that was understood and accomplished, chromium plating was established.

Is this not true of all electroplated coatings? Is the same attention being paid to the necessity of correctly preparing the surface of the steel for a coating of cadmium or zinc? Can the same degree of protection against corrosion be had on just a cleaned surface as upon a surface that has been prepared so that there is a perfect bond between the cadmium or zinc and the base metal? There can be but one answer—all electroplated coatings must be bonded to the base metal if the quality of electroplating is to be improved and maintained at a standard that will compete with any special alloy metal.

Immersion acid pickling can be used with success on cold rolled steel or upon steel that has been polished. The strength of acid and the time of pickling should be such that the surface is slightly, yet imperceptibly etched. In the working or polishing of steel a thin amorphous skin is formed on the surface. If this is not removed or broken through, there will not be a bond of the electrodeposited metal. This is illustrated on page 111 of the "Principles of Electroplating and Electroforming"—revised edition. It will be seen when the "skin" caused by polishing is not removed that the deposited metal seems separated from the base metal. When the "skin" is removed by pickling, the structure of the electrodeposit follows the structure of the base metal, and there is evidence of a perfect bonding.

**Electropickling**

Electropickling while long known has not been generally adopted because of the condition of the work after being processed. The methods have been studied and improved, and today one is being used with much success. It is not advisable to attempt to use the same pickling process for all classes of work. For cold rolled steel or for polished work, a sulphuric acid pickle of varying strength can be used with direct current. A 32 degree Baumé sulphuric acid is being used for this class of work. The time of pickling is from one to three minutes. This pickle is not for the removal of rust or scale but for the preparation of the surface of the steel so that a bonding of the electrodeposit will be had.

Work that has a scale because of annealing or forging can be treated in an electric pickling process developed in the laboratory of Hanson-Munning Company. It not only pickles the work, i.e. removes the scale, but it also brightens the steel so that it has the appearance of having been plated. By this process all scale, even that in the deepest pits, is removed; and the steel is in a perfect condition to be polished or to receive an electrodeposit directly. A considerable saving can be made if forgings are electro bright dipped previous to the polishing operation. Scale is hard, often glass hard; and considerable abrasive must be used to remove it. A coarse grain abrasive is necessary, and when part of the scale is removed, this coarse abrasive cuts deeply into the metal and makes the subsequent polishing operations more difficult and expensive. If the scale is removed, the polishing can be started with a finer abrasive, the time of operation decreased, and the quality of the finish improved. There is no evidence of the cuts left by a coarse abrasive or of the necessity of using a cross polishing operation.

When steel with scale is polished, it is not possible to remove the particles of scale in the fine pits or in the pores of the metal. Adherent electrodeposits cannot be had on scale. Where there is scale in the pits, the deposit will be thin due to the fact that it has had to creep or bridge over the scale—the scale acting to electrodeposition as a graphited surface—the deposit gradually spreading over it rather than immediately covering. These thin spots give a false impression of the amount of metal deposited as they indicate in a salt spray, Preece test, or in any accelerated corrosion test the protective life of the electro coating.

If the steel is processed in the Hanson-Munning Bright Dip, it is absolutely free from scale. Any electrodeposit will take all over immediately, and there will be a perfect bonding. A bright dipped steel can be given a clean, clear coating of cadmium or zinc in 10 seconds at as low a current density as 10 ampere/sq. ft.

This coating, of course, is not sufficient for protection, but it proves that the surface of the steel is far more clean and in a better condition to receive an electrodeposit than steel that has been pickled by immersion. Such a steel, cadmium or zinc plated under the same conditions, requires from three to five minutes to obtain a clear coating. An acid copper coating obtained by immersion in one second is clear and so adherent that it will withstand scratch brushing with a steel wire wheel. Electrogalvanized conduit pipe withstands from two to three one-minute Preece tests more than when pickled by the best known immersion process. The weak spots caused by scale inclusions which are thinly coated by electrogalvanizing are not present—the electrodeposit of zinc is continuous and uniform over the entire surface. On bumper bars not only is the cost of polishing operations decreased, but also the salt spray life with the same amount of electro coating is increased. The deposit upon a Hanson-Munning bright dipped steel is bonded to the base metal in a manner that has never before been accomplished. There is no secret reason—it is self-evident—the surface of the steel is clean and free from passivity.

At this time when electroplated coatings are being compared more closely than ever in the history of electroplating, it is essential that every precaution be used to clean steel in such a manner that there will be a perfect bonding of the deposit and the base metal so that the greatest amount of protection against corrosion be obtained.

## Protecting Bakelite Plating Barrels

Q.—We would like to know if there is anything on the market suitable for coating electroplating barrels made of laminated bakelite. We are using one in a cyanide zinc solution that contains caustic soda, and the laminations have a tendency to peel. Please let us know if you can suggest anything.

A.—Phenolic resins are attacked by alkali solutions. The difficulty that you are having is due to the resin holding the cloth together being dissolved by the caustic alkali in your solution. At present there is nothing better than what you are using for the construction of a plating barrel. There is no material that can be used to repair the parts attacked. E. E.

# The Fundamentals of Brass Foundry Practice

By R. R. CLARKE
Foundry Superintendent

## A Description of the Basic Laws Which Control the Melting and Casting of Metals and Their Application to Practical Foundry Work—Part 28.*

ALL defects in castings are of either physical or chemical derivation. Physical defects are those evidenced by such common instances as a shrunken cope surface, a gate pin hole, a draw between light and heavy sections, honeycombed or cavernous metal from a simmering or blowing core. Chemical defects may cause gasified, honeycombed or oxidized metal, drossy and scummy surfaces of castings, failure to meet specifications due to weakness of metal, etc. Physical defects will, therefore, be seen to originate chiefly in the molding; chemical defects in the melting of the metal.

The very instant that heat is applied to any metal that metal starts on its way to its gaseous form, negotiating that way through its solid state to the plastic, then liquid and on to its volatilized state. The expansion of the metal, even in its solid state is merely the beginning of its journey to its gaseous and its most voluminous state. On the return to liquid or solid state the metal reverses its actions, such as expansion and contraction, which are among the most critical of physical causes and changes and of vital consideration in molding. Often physical and chemical causes and changes are aligned in the making of a casting and render a defect either more marked or not at all in evidence when acting alone rather than in concert, as in the case of casting shrinkage or cleavage with ruined metal, but not materializing with good metal properly combined, proportioned and manipulated. So long as metal remains strictly in its liquid state it will return to its solid state with no great quantitative loss. What loss does occur is primarily that of oxidation which by careful practice can be fairly well controlled. But as the alloy approaches its volatilizing or gaseous state, it disappears with a staggering loss and beyond all ordinary recovery. The volatilization of the metal zinc either alone or in a high zinc-copper alloy will illustrate the point. It will thus be seen that furnaces and furnace practice have a distinct bearing on metal loss and casting cost as well as the metal quality.

### Basis of Good Melting Practice

The primary considerations of good alloy melting practice are:

1. The proper methods of alloying the metals to a complete and thorough union of homogeneous metal.
2. The prevention or curing of oxidation, gasification and dross.
3. The realization of the maximum of quality and strength in the alloy.
4. The lowest possible melting time and cost.

*All rights reserved. This series will be collected and published in book form. Parts 1 to 27 inclusive were published in our issue of July, August, September, October and November, 1926; January, February, March, April, May, August, September, November and December, 1927; March, May, August, September and December, 1928; March, April and October, 1929; May, August and October, 1930, July and September, 1931.

### Types of Furnaces

To the realization of these objectives the first consideration is the type of furnace to be used. Of these there are many, each type expressing different mechanical applications of a similar principle. Furnaces differ primarily in the fuel used. We have broadly, the electric furnaces (sometimes referred to as a non-fuel furnace) and the fuel furnaces, named after their fuels employed such as the coke fired, crucible pit furnace; the pit crucible furnace, oil fired; the pit crucible furnace, gas fired; the open flame, oil or gas fired; and the cupola furnace, coke fired. Of the coke fired pit furnaces, some are natural draft, others of forced draft, leading to another commonly known distinction among them.

### The Old Pit Crucible Furnace

For long years, brass foundries melted all but universally in the coke fired, natural draft, crucible furnace. Those were days of methods more simple and crude, less scientific and organized than the modern order of things. The author of this work holds no ties to old orders swept aside by the movements of progress. For the natural draft coke fired crucible furnaces of yesterday, he has neither sentiment nor argument. But from a standpoint of metal quality he cannot deny them his most sincere admiration. They undoubtedly produced high standards and if in their simple, crude, unaided ways the old foundrymen could make clean, solid, high grade castings from this melting medium, what might they have realized with the excellent means of science, the chemists and the metallurgists and the laboratories of today coming to their aid? The author has not used a coke fired crucible furnace for over 15 years. He realizes that from a commercial, economic basis it is entirely out of the question. He is none the less decided that from a standpoint of quality it will never suffer this elimination. Its capacities for quality are yet attested in many foundries by the fact that different alloys of special quality are melted in the coke pit.

Among its primary assets the following are noted: (1) It supplies a more even and uniformly distributed heat. (2) It automatically admits only that quantity of draft atmosphere as will satisfy fuel consumption. (3) It relieves the surface metal of all gases of combustion playing directly on that surface. (4) It allows without disturbance, surface coverings throughout melting periods.

The principle of the furnace is simple, a square or round fire-bricked enclosure in the ground dimensioned some 6 to 8 inches greater than the crucible's greatest diameter and some 12 to 15 inches greater than the crucible height. The draft opening to the stack should be at least 3 inches above the crucible top after it has settled to protect the metal surface from the fumes and gases.

In melting in the coke pit much depends upon the

quality of coke used. Time of melting falls and quality of metal rises with the best obtainable 72 hour foundry coke. Regardless of the coke quality, pieces of coke should not be allowed to fall into the molten bath in the crucible to contaminate it.

The coke pit forced draft furnace is simply the natural draft aided by air supplied under pressure underneath the fire bed. This arrangement dispenses with furnace stacks and hastens the melting period. It never came into universal use and was practically unknown to the older systems of brass melting, due probably to the fact that equipment for it was lacking and the cost all but prohibitive in the earlier periods, if at all attainable.

Among those metals and alloys still often melted in the coke pit are copper and the low zinc copper-tin alloys where the zinc content is barely sufficient to handle the deoxidizing and the degasifying evils.

### Oil or Gas Fuel

The oil and gas fired crucible furnace uses practically the same principle of melting, excepting for the fuel change. The furnace construction is, of course, altered to the situation. It involves a burner and mixer piped into the furnace at or near the furnace and at an angle of some 45° to give the flame a circular, swirling motion as it mounts upward to the furnace top. Covers for these furnaces are usually of the swinging, lifting or sliding type, and generally have a top hole slightly less in diameter than that of the crucible top. Through this hole the metal is charged and the spent heat and gases of combustion escape. Frequently charging funnels are built on these tops to take the entire charge for preheating and melting down into the pot underneath.

Another form of fuel fired crucible furnaces is that of the tilting type. These give the crucible a permanent position in their brick lined enclosure which is a furnace shell on trunnions, operating for tilting by gear attachments. The crucible remains in the furnace throughout its life, the metal of each heat being poured into ladles. The relief from punishment of handling the crucible is an item of value in this arrangement.

Oil or gas furnaces produce quality metal, but represent comparatively expensive methods due to crucible cost and fuel consumption. Oil as compared to gas is the cheaper, but less efficient in point of time, uniformity, heat generated and all around convenience. Gas, however, appears to give the crucible the greater punishment. Respecting quality of metal, all things else being equal, the author has never found any great well-proven difference. Much depends upon heat and mixture control. Air and oil property mixed and supporting a uniformly correct flame will melt probably slightly the better quality, although a close control of air and gas will give results not far short of standard.

### Open Flame Furnaces

Non-crucible furnaces are of many different types and varieties. Among the more common are the different forms of oil furnaces of open flame principle. These furnaces took on additional popularity among foundrymen during the war when the German clay used in the manufacture of crucibles could no longer be obtained and efforts to duplicate it resulted in very inferior crucibles. Of their earlier forms the old Schwartz "tea-kettle" furnace was prominent. This pioneer in open flame melting of copper and its alloys observed sterling principles of its kind and reflected substantial credit to its makers. In different foundries it is still being used to melt satisfactory metal. The furnace is of tea kettle shape with two top oil burners so staggered as to direct the two flames to a meeting point directly over but not impinging on the bath.

Other forms of oil open flame melting furnaces are the barrel type, the box type, the double barrel or duplex design, etc. In the barrel type, the furnace rests on trunnions, the burners entering at the ends. Some furnaces are equipped with burners at both ends, others admitting the burner at the one end only. Of the two, the two-end burner is the more efficient and logical. Later types of these furnaces were further equipped with a rocking device whereby, during the melting period, the furnace rocks gently back and forth in an arc. This supplement offered quite an advantage.

The open flame, fuel furnace is purely a metal reservoir with heat so supplied as to effect the melting of the metal with the least destructive action. This minimum of destruction is best realized from a reflected or reverberatory rather than a direct or impinging application of the flame on the metal. It is further in evidence when the correct proportions of air and fuel are uniformly and steadily mixed and delivered to the furnace combustion chamber. As a matter of economy as well as of metal quality, this correct proportion of air and fuel delivered steadily under proper pressure so as to support an even, non-destructive flame is one of the main factors of good practice. In establishing these proportions it may be well to point out that an excess of oil gives a heavy yellow flame emitting considerable smoke, while an overabundance of air gives a thin pale to green flame and no smoke. The former is a waste of oil and of time in melting, the latter causes oxidation of the metal. Flames are generally referred to as "reducing" and "oxidizing." The reducing flame is the correct proportions of air and fuel so mixed and delivered to produce a flame that will melt but not injure the metal abnormally. The oxidizing flame may be a hotter, faster melting flame, but it is distinctly injurious because of excessive air not fully consumed. The proper melting flame is a reducing flame of consistent volume, white color and a very slight trace of smoke accompanying. This, of course, means a greater fuel consumption, but it is a common saying among brass foundrymen that it's better to burn oil than to burn metal.

Properly manipulated, open flame furnaces will melt quality metal. They have melted vast quantities of it and will. Manipulation, however, has everything to do with it. They exemplify a different principle from the crucible, a principle basically not so sound and calling, therefore, for greater pains and greater caution. While it cannot be said that they will produce in full the crucible quality, it can none the less be denied that, given the attention and supervision they require, they will deliver satisfactory results in the great majority of cases. To obtain best results from them, the following details are important:

1. Keep them well lined, clean, free from slag and crusting metal.
2. Use good dependable grades of fuel oil.
3. Charge metal in as clean condition as possible. Gates should be sand-blasted, oil, grease insulation, etc., removed from metal before charging, etc.
4. Melt with a reducing flame of steady and uniform burning.
5. Keep close check on furnace temperatures to avoid sudden extremes.
6. Do not overheat or soak the metal.
7. Immediately before emptying the furnace, throw charcoal in small lumps over metal surface, and place charcoal in the bottom of the pouring ladle.

**This series will be concluded in an early issue.—Ed.**

# Foundry Sand Control

By A. A. GRUBB

Consulting Metallurgist*

## The Organization and Carrying On of a Program of Sand Control Are Described Clearly and Concisely

FROM THE BULLETIN OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION, NOVEMBER, 1931

SAND control in American foundries varies widely in degree and character. In some plants it is entirely in the hands of molders who judge the properties by feel and behavior without the aid of modern methods of measurement. In other foundries a molding foreman's judgment—alone or in conjunction with that of the molders—determines the new sand additions and the treatment the heap sand is to have.

It is estimated that from twenty-five to thirty per cent of the American foundries still try to control their sands without testing equipment of any kind. However, these foundries probably represent less than ten per cent of the total molding capacity of the country.

Practically all of the larger foundries, and many of the smaller ones, employ modern testing equipment and carry on what may be termed technical control of their sands in varying degree.

### The Four Steps of Sand Control

The introduction and maintenance of sand control in a foundry consists of several steps, each of which may be looked upon as involving separate and distinct problems. For the sake of clarity in handling the general subject of sand control, we will mention these several steps and then proceed to discuss each of them in turn. They are as follows:

**First,** discovering by experiment and observation the properties of sand most satisfactory for the castings that are being made and the molding equipment that is available.

**Second,** making tests on the heaps at sufficiently frequent intervals as to keep informed on any changes that may occur in these properties.

**Third,** obtaining new sands, clays and other materials for use in the sand heaps, the properties of which are known and whose effects on the heaps are understood.

**Fourth,** making the proper additions to the heaps as indicated by the tests, and properly incorporating these additions.

### Determining the Desired Properties

The determination of proper characteristics is not an easy matter. There are so many variables involved, and so much depends on the molder's skill, that definite conclusions can be drawn only after every factor has been taken into account and when averages are taking over long periods.

For instance, the lower limit of permeability for a certain job can be determined only after the losses due to to blows and mis-runs have been consistently high when the permeability has been below a certain figure. A short test or a brief period of observation may lead to wrong conclusions because cold metal, hard ramming, wet sand or other causes may produce such a loss even though the sand itself is of proper fineness and clay content.

### Other Research Work

Search for the best types of sand, and the sand properties that are most suitable for certain types of work has yielded fruitful results in many foundries. Some of this work and the results that were accomplished are reported in the papers of R. F. Harrington, H. W. Dietert, George Batty, Walter Ranis, W. G. Reichert, A. H. Dierker and others, which are to be found in the publications of the American Foundrymen's Association. A few important points from these papers will be recounted here.

AVERAGE TEST DATA ON HEAP SANDS USED FOR VARIOUS TYPES OF NON-FERROUS CASTINGS

| | Fineness | Bonding Substance | Moisture | Permeability | Green Bond Strength Tensile | Green Bond Strength Compr. |
|---|---|---|---|---|---|---|
| Light to Medium Brass | 218 | 13 | 8.0 | 17 | 6 | 4 |
| Heavy Brass | 108 | 12 | 7.3 | 51 | 5 | 4 |
| Aluminum | 232 | 19 | 8.0 | 8 | 6 | 5 |
| Steel Facing | 47 | 8 | 4.0 | 230 | 7 | 5 |

The data listed in Table 1 give some idea of the heap sands that are being used for various types of castings in American foundries. They are averages of test data on samples of sand from a large number of foundries and are based largely on a survey[1] which was made by P. Willard Crane for the Commercial Club of Cincinnati.

There is a growing tendency to use lower clay content on all kinds of work. At the same time, bond strength values are being improved by better handling of the sands, milling, etc.

### Control Tests

The second step in a sand control program is the systematic examination of the heats of detect changes in properties that come from use of the sand. The question that usually arises is, "What tests should be made?"

The Wisconsin survey, referred to above, reveals that the permeability and moisture tests are most widely used

*The above paper by the late A. A. Grubb, whose untimely death on September 29, 1931, was a source of deep loss to the foundry industry, was prepared by him as the 1931 A. F. A. exchange paper to the Dutch Foundry Association, for their annual meeting. Mr. Grubb was known for years as one of the leaders in research work on foundry sands, and his many papers and reports aided the industry greatly in its foundry sand problems.

[1]Sands Used for Different Classes of Work, P. Willard Crane, Transactions American Foundrymen's Association, vol. 36 (1928).

for foundry control. This probably is true elsewhere as well. Next in importance and in popularity is a green-strength test, after which comes dry-strength measurement.

The property of permeability is so directly connected with casting quality and is so easily measured that it affords an ideal control test. Moisture is fully as important a factor, but is more difficult to handle. Able foundrymen have estimated that over half of their sand troubles are due to improper moisture. The time required to make moisture deteminations and the comparatively quick changes that occur due to evaporation make this property hard to control, especially where there are a large number of heaps in the foundry.

The Ohio Brass Company, when operating some eighty individual sands heaps in their bronze and malleable iron foundries, found it practical to use moisture tests to train their molders to accurately judge the temper of their sand by feel. The tests were made daily and reported back to the molder; his estimate of the moisture content was compared with the test results, and after a number of such tests he became able to judge the moisture in his sand with fair accuracy. He was then held responsible for the temper of his heap. Penalties for losses further stimulated his efforts in this direction.

### Green and Dry Strength Tests

Control tests for green-bond strength are very useful and are almost as widely used as permeability and moisture tests. The property is measured under compressive, tensile or shearing load, any one of which methods apparently serves control purposes.

It has been the writer's experience that it is well to establish upper limits on bond-strength values, as well as lower limits. If the strength of a heap is too low, drops, cuts, washes and similar troubles are encountered. If it is too high, the sand does not flow so well in the flask and the mold surface is apt to lack uniformity in hardness unless extra care is taken in ramming it up. Furthermore, there is more tendency to produce "scabs" on the castings.

Low green strength does not always indicate that there is insufficient clay in the sand or that it has been burned out. Failure to properly work the sand results in low strength.

Mulling and similar methods of working sand increase its strength. In recent years there has been an increasing tendency on the part of foundrymen to use sands of lower clay content and to maintain the necessary green strength by efficiently working the sand. This is easily accomplished where mechanical conditioning and conveying equipment are employed, especially if there are mullers or pug-mills in the line of flow.

There are a number of American foundries making tests for dry strength as a matter of control. It is generally recognized that for green-sand as well as dry-sand molding, the mold must have strength after the water has been dried out.

On the other hand, sand can have too much dry strength for successful molding of certain jobs. Cases have been found where cracked castings were caused by too high dry strength and the loss was eliminated by using a sand carrying a leaner type of clay. Dry strength also is decreased by working sand as dry as possible, or, as we call it, "on the dry side."

Clay and fineness tests on heap or conveyor sands are made by only a few foundries, and not so frequently as the other control tests. The time and equipment required to make these determinations probably operate against their wide use for control purposes. Since the working properties, permeability and strength, both green and dry, are determined by moisture, fineness and clay, data on all three of these factors are of considerable help in maintaining uniform molding properties.

**This article will be concluded in an early issue.—Ed.**

# Bonded Sheet Metals

Q.—Around 1919 there was a certain method used for the production of compound metal such as, for instance, a sheet or bar composed of two or more layers of dissimilar metals or a core and sheathing of dissimilar metals. This method was for the purpose of uniting a plurality of metallic substances together so as to form an integral structure which could be subsequently rolled, hammered, forged or drawn.

This method consisted in the production of a metallic sealing weld between the edges of two dissimilar metallic bodies which were placed in juxtaposition so as to keep out air and prevent oxidation during the subsequent compacting treatment which would ordinarily be rolling.

Or to further describe it, it consisted after bringing the surfaces of the two bodies together of locally welding the exposed edges together by the application of heat so as to produce a metallic sealing weld.

We are trying to find out just by whom this method was used and when and where, and we thought possibly you might be able to assist us.

A.—Around 1919 the Copper Clad Steel Company at Rankin, Pa., produced a copper-coated steel sheet. The operation for producing it consisted of setting a heated steel billet in a mold whose inside diameter was somewhat larger than the billet diameter, pouring molten copper into the mold, and subsequently reducing the billet by rolling to the desired gauge. The operation seemed to work satisfactorily, but the product has not come to our attention for quite some time.

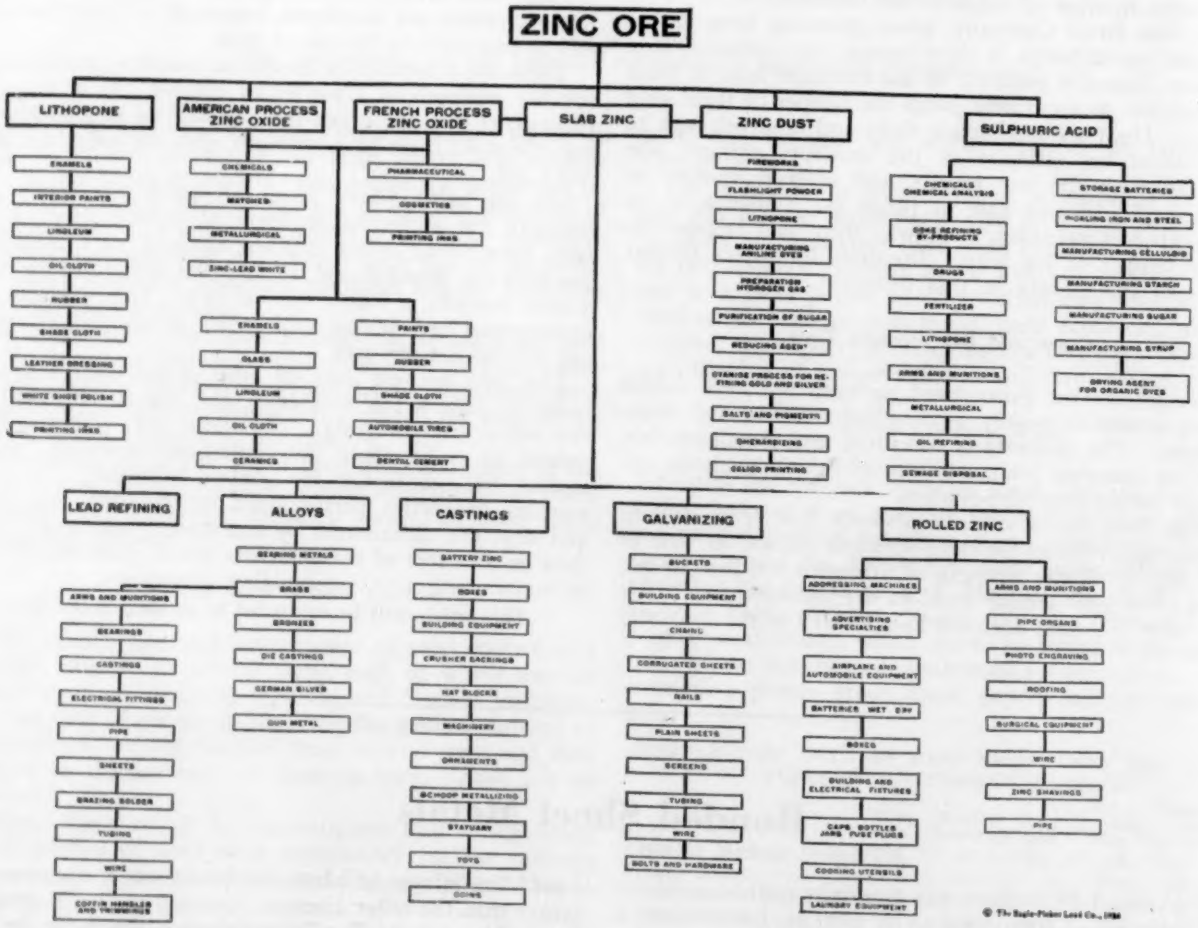
Some fifteen years ago a firm in Hamilton, Ohio, united dissimilar metals by a process of welding copper sheets to steel sheets. This completed the operation, and the material was to be used for vault doors.

A more recent product, and one that we know is on the market today, is produced by the Lukens Steel Company of Coatesville, Pa. It is known as nickel clad steel plate, and is a hot rolled bi-metal of pure nickel and steel. A layer of pure nickel is bonded to a heavy gauge of flange quality steel. They have recently perfected this method, and the process is a more or less guarded one. The Midvale Steel Company of Philadelphia, Pa., makes a similar product. The Superior Steel Company, Pittsburgh, Pa., has a process for making a bonded metal of open hearth steel and rust resisting metal. Applications have been made for patents. We have no knowledge of the actual process. —W. J. Pettis.

# Zinc Enters Many Industrial Fields

## The Tree Below Shows What Becomes of Zinc Ore After It Is Reduced to Metal, as Well as the Uses of a Number of Other Zinc Ore Derivatives

THIS CHART IS REPRODUCED THROUGH THE COURTESY OF THE EAGLE-PICHER LEAD COMPANY, CINCINNATI, OHIO

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## $16,000 a Year from Ashes

Approximately $16,000 a year is realized from salvaging metals from ashes produced in the scrap incinerator at the Schenectady, N. Y., plant of the General Electric Company. The ashes, instead of being loaded into a dump car and delivered to the dump, are first run through a ball mill, where they are pulverized, the larger pieces of metal passing out of the mill and over a magnetic separator which separates the magnetic scrap from the non-magnetic material, which consists of copper, brass, aluminum, etc. The finer material discharged from the ball mill passes over an inclined, longitudinally grooved "concentrating table," which has a stream of water flowing crosswise of the material. The metal, being heavier than the ash, slides down the bottoms of the grooves and falls off the lower end of the table, while the ash is washed off the side of the table and is then pumped through a "dewatering cone" which discharges the dewatered ash into a dump car. The ash is used for filling in low ground, and the metals and concentrates are sent to the smelter or sold as scrap.

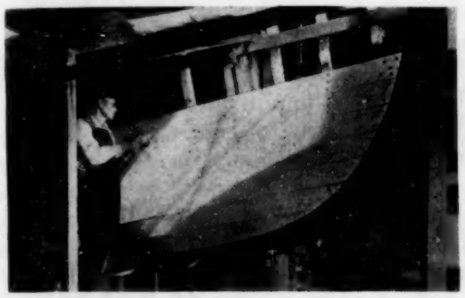
By this method approximately 100,000 pounds of ashes are ground and washed, and from 20,000 to 25,000 pounds of metals and high grade smelting material is recovered each month.

# The Automobile and Motor Boat Shows

LAST month two great exhibitions of considerable importance to the metal producing, fabricating and finishing industries were held in New York—the annual national automobile and motor boat shows. The indications at both were indeed gratifying, the exhibitors in general showing great optimism, which was said to be by no means a mere whistling to keep up courage, but rather engendered by very large attendance, with good business booked at the shows. Such news must interest the fields covered by this journal, since their products are so widely used in automobiles and boats.

The automobile show indicated a continued and expanding consumption of metals and finishes of all kinds, including sand, and die-castings, pressings, stampings, forgings, wrought and turned metals, and nearly every type of finish. Automobile production takes more of some of the nonferrous metals than any other industry.

There are a few innovations to report, including the application of a tin coating to cast iron pistons. The tin coating is said to improve the pistons considerably by making them easier to fit to the cylinders, and helping to eliminate out-of-roundness by giving less wear to the cylinder walls. Another development is the resumption of the use of radiator temperature indicating devices attached directly to the radiator cap. The "Motometer" has been brought out in a highly modern design, employing a casting which is chromium plated. The instrument is so designed as to be applicable to types of radiator caps already used on cars, without sacrificing any of the design. There is also an increasing tendency to give a good finish to the under parts of automobiles, especially sections of the chassis that are seen easily. Paint, enamel and lacquer goes into dressing up such parts. Motors, too, are being treated better in the matter of finishes. Many engines are now partly housed in japanned or enameled enclosures; and cap screws, bolt heads and nuts are to some extent being nickel or cadmium plated so that the engine will make a good showing when the hood is lifted, as well as for protection of such parts from corrosion. The tendency to give the regular line production cars more finish, even on ordinarily unexposed parts, has no doubt received some impetus from the fact that motors and cars which are especially decorated with gold, silver and much chromium plate have drawn so much attention at shows and in showroom windows.



Fastening a United States Coast Guard Hull with Everdur Screws.

Photo, American Brass Co.

In the matter of general finishing, chromium plate continues to hold the field against all comers for finishing of lamps, radiator shells and guards, bumpers, hardware, hub caps, tire holders and other accessories, just as lacquer which is applied by spraying remains by far the most popular body finish. There has even been a slightly increased use of lacquer or enamel in one direction—at the expense of chromium plate. This is in the finishing of radiator shells. Some cars have a lacquered or enameled shell with chromium plated trimmings, instead of a wholly chromium plated shell.

The Ford company is never represented at the Show, but generally holds an exhibition of its own. This year the Ford show has not yet been held, but it is reported that stainless iron will continue to be used on Ford cars instead of chromium plated metals.

The motor boat show disclosed a continued consumption of many kinds of metals in that field of production. It is of interest to the metal producing, fabricating and finishing industries that there was probably a record attendance at the show this year, and this interest was made more concrete by the reports of the concerns showing their products that business was booked in very good volume indeed, considering general conditions. As pointed out in these pages last year, the metal and finishing industries are already selling considerably to the boat business, and the potentialities are becoming increasingly worth while as the American public grows fonder of marine playthings.

Naturally, the anti-corrosion metals have a very wide field of application to marine construction and adornment. The copper and nickel alloys are used most widely, while lead, zinc and numerous other metals are also absorbed. Boat accessories is probably a wider field than automobile accessories, as far as variety of product is concerned. The multitude of practical as well as decorative parts, devices and "gadgets" used on boats is startling.

As for finishes, every type has its place in the marine field. All types of plating are used, including nickel, chromium, copper, brass, tin, zinc and silver. Galvanizing is a most common finish, produced either by zinc plating or by hot zinc dipping. Lacquers, enamels and paints play an indispensable part in boat decoration and protection.

Photo, International Nickel Company

**Monel Metal Marine Shaft, 14 Feet Long, 6 Inches Thick**

Among the exhibits of special interest to the metal and finishing lines were the American Brass Company's line of copper-base alloy products, with Everdur featured; The International Nickel Company's display of nickel alloys, featuring Monel metal, including a marine shaft of 6 in. diameter, 14 ft. long, weighing 1534 lb., forged from a single billet and said to be strong enough to lift a 1230-ton destroyer; hot galvanized products and galvanizing service, shown by L. O. Koven and Brother, Inc., Jersey City, N. J.; cleaners by Quigley Company, Inc., New York; lubricants by Joseph Dixon Crucible Company, Jersey City, N. J.

# EDITORIALS

## Pegging Silver Prices

THERE has been continued agitation to raise the price of silver and keep it on a "reasonable" level just as there have been similar efforts along the same lines for other metals. Silver, however, has one "talking point" which the other metals cannot claim. It was once an important monetary metal; consequently its advocates are calling for the help of governments in re-elevating silver to its seat at the right hand of the throne.

Producers of silver and other friends of bi-metallism base their claims on the following arguments.

1. The scarcity of gold has caused a drop in commodity prices throughout the world.
2. Since there is insufficient gold to serve the purpose of a medium of exchange, it is necessary to add another medium.
3. Silver is eminently suited for such a post by reason of its standing as a precious metal and its former use in this capacity.
4. Setting and keeping the price of silver at a normal level would add greatly to the purchasing power of the silver producing and silver using countries, which would be reflected very quickly in the business of the world.

To these claims, opponents of monetization such as Handy & Harman, the large silver traders, answer as follows:

1. In order to be workable, bimetallism would have to be accepted internationally, which would require an agreement by the principal nations of the world upon a suitable ratio between gold and silver. The likelihood of such an agreement at this time is remote.
2. Concentration of gold in certain countries and its scarcity in others is not a cause of the present depression, but the effect. The movement of gold into or from a country reflects the favorable or unfavorable position of that country in international trade. Silver used as a coinage medium would just as quickly reflect the existing economic conditions, of which the flow of a medium is merely an index.
3. The low price of silver cannot be blamed as a major cause of the depression. The silver using countries (or silver "hoarding" countries) are China and India. These countries are not exporters of silver; they actually import and absorb two-thirds of the world's supply of the metal. If the low price of silver made or broke the purchasing power of these countries, we should find their foreign purchases in the last year or two very much lower than before, especially in comparison with other nations. As a matter of fact, the dollar value of all foreign purchases from the United States in 1930 declined 38.3 per cent while the dollar value of China's purchases from us declined only 12.8 per cent; this during a period when silver dropped from 39 to 28 cents an ounce. In other words, China does not pay for its purchases with silver. It pays for its imports by means of its exports.

The large losers in a price decline of silver are the silver producing countries, such as Mexico. However, the small part that silver has played in the world depression can be seen from an analysis of the statistics. A total of 250,000,000 ounces are produced annually. A decline in price of 40 cents (much larger, of course, than any actual annual decrease) reduces the total value of silver in all the producing countries by $100,000,000. This sum is a very small part of the world's international trade.

Resting on the above thesis, opponents of monetization point out that low prices for silver impair the purchasing power of silver producing countries comparatively little, and of the silver using countries hardly at all. For that reason, silver is said to be a minor factor among the causes of the world's depression, and the artificial increase of its price would have small effect on business improvement.

It seems reasonable to expect that silver will follow the trend of general economic conditions like other commodities. Its price will improve when times improve. In the meantime it is suffering, of course, but it is not in a worse position than copper, zinc, tin and other raw materials; nor is the fixing of its price any easier in the case of silver than it is with other metals. We have had very sharp object lessons in the past two years on the danger of attempting to set prices contrary to the general trend.

## The Future of Metals and Alloys

IT is pointed out by no less an authority that Dean Hoover of the Leland Stanford School of Engineering in California, that a dearth of metals may come upon the earth, beginning perhaps a century from now. Using our minerals as we are, at the rate of a billion tons a year, our reserves in sight are decreasing and giving us warning of an impending change in our methods of living. In other words, substitutes may have to be found for metals.

Possibly so. Dean Hoover's estimate is certainly as reliable as anyone's can be on such a vague question. Perhaps the time will come when only aluminum will be available, through the discovery of methods of extracting it from clays of which there are practically unlimited quantities in the earth's crust. We feel fairly safe in saying, however, that technological development will take care of us in the future, by finding new ways of extracting the formerly unrecoverable metals, or by finding substitutes for metals, just as it has already brought in the metal and alloy age.

The development of our alloy age in the past generation has been a romance no less exciting than any work or fiction which could possibly have been devised by the most imaginative author. Man's knowledge of metals goes back to prehistoric times when he probably found free gold in outcrops and used it

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for ornament. He stumbled across meteorites from which he somehow managed to break off and hammer out weapons of this extraordinary iron-nickel alloy. Gold, the most valued metal, is strangely enough at the same time the least useful from a strictly "practical" standpoint, as it has assumed major economic importance only with the development of industry and its formal adoption as a medium of exchange.

Dr. Zay Jeffries, in a paper read before the Conference on Metals and Alloys at the Case School of Applied Science in Cleveland, November 18 and 20, sketched in an interesting fashion the development of metallurgy and its possibilities in the future.

There are now about 5,000 varieties of metals and alloys in commercial use (only about 25 of these being pure metals). Their order of importance from a tonnage standpoint is iron, copper, lead, zinc, aluminum, tin, nickel, although this order might be subject to some revision if it were based on value. The breakneck rapidity of our industrial development is shown nowhere more clearly than by the fact that the American pig iron production for the year 1830 was consumed by us in one and a half days in 1929.

Each metal rests largely on certain industries. Steel production depends upon the consuming power of the railroads, building and construction, ship building and automobiles. Copper's largest outlet is the electrical industry. Aluminum depends upon automobiles, kitchen utensils and now to an increasing extent upon aircraft, in which it has practically swept the field. Zinc's best customer is the galvanizing or zinc coating industry. Tin goes mainly into tin plate. Nickel at one time depended almost entirely upon nickel steel for its subsistence but with the decrease in the use of armor plate it has broadened its field of usefulness in amazing fashion, now going into dozens of industries in small amounts but adding up to a large tonnage.

The huge increase in the use of metals and alloys is due in a large measure to the development of heat treating, a young science, but lusty and growing daily. This science has availed itself of new instruments, first the microscope, then the pyrometer, then the spectroscope and last but perhaps eventually among the most important, the X-ray machine. Progress in science has been increasingly rapid, year by year, gaining momentum steadily, and industry has lost no time in availing itself of discoveries and making practical use of its findings. As Dr. Jeffries states: "The activity in science is so great at present that the time between discovery and utilization is less than any time in previous history."

## The Reconstruction Finance Corporation

THE hopes for an early recovery in business are centered now in the results of the operation of the newly formed Reconstruction Finance Corporation. This corporation, with a capital of $2,000,000,000, stands ready to aid banks, railroads and worthy solvent industrial enterprises to tide over the present emergency, enabling them to continue operation and thus prevent the further spread of unemployment in these difficult times.

The only objection that has been advanced to this plan is that it is a form of inflation which is dangerous, but this is a view which, it is generally agreed, has no justification in fact.

Inflation in the accepted sense of the word is caused by (1) a large issue of fiat money by the Government; (2) a change in the value of currency; (3) huge issues of Government securities. None of the above steps is contemplated. The volume of securities to be issued by the Reconstruction Corporation is small compared with the total of the Government obligations outstanding, and the current issues are world famous for their soundness.

Probably the most important function of the Reconstruction Corporation is not so much the actual lending of money as it is to have on hand a pool of available credit which can be used when necessary. The very existence of such a strong stabilizing factor will prevent the runs on banks which could unsettle even perfectly sound institutions in good times, and it will bring out of its hiding places the hoarded currency which is now unavailable for business purposes.

No one can predict that business will immediately rise rapidly, either because of the new Corporation or for any other reasons. It is safe to say, however, that the existence of such a strong backlog of cash and credit will stop the panic which was about to cripple the financial resources of the nation.

A pending step of Congress is the formation of a central mortgage refinancing institution through which it is hoped to release funds for building purposes. The progress of these plans will be watched with hope not only by our own people but by the rest of the world.

## Health Hazards in Sand Blasting

AT a recent meeting of the National Safety Council, held in Chicago, a paper was presented by Dr. L. Greenburg of the United States Public Health Service, discussing sand-blasting methods in the metal industry from the point of view of health. He found, of course, that a serious hazard does exist namely, silicosis, the deterioration of the lungs due to the inhalation of silicious material. The Committee which studied this question considered all phases of sand-blasting including equipment, abrasives, ventilation and protective devices.

The equipment throughout the industry consists largely of barrels (44 per cent) and cabinets (21 per cent); blasting rooms and tables make up the balance. About 65 per cent of this equipment is located in foundries, about 22 per cent in forging and heat treating plants and the plants in miscellaneous factories, probably including metal finishing work.

Silicosis evidently results from the use of abrasives having a high quartz content, a large number of particles of dust per unit of space and the duration or length of service in this type of work. It is noteworthy that the abrasives used in sand blasting plants were found to be in the proportions of about 15 per cent sand, 45 per cent steel and 40 per cent mixed abrasives.

Protective devices consisted mainly of positive pressure helmets (41 per cent) and respirators (26 per cent). About 33 per cent of the plants visited had no protection whatsoever.

The silica content of the dust in the air where steel abrasives alone were used was less than 5 per cent. Where sand and steel mixed were used it was about 25 to 60 per cent and where sand alone was used, it ran from 80 to 100 per cent. All the dust caught was a dangerous size, that is, small enough to get into the lung tissues.

The investigation seems to have been very fruitful, pointing to the fact that protective devices indispensable as they are, are omitted in an alarmingly large number of cases, also that sand is a much less safe abrasive than steel.

# Correspondence and Discussion

## Acid Resistant Floors

Editor, METAL INDUSTRY:

In the November, 1931 issue of THE METAL INDUSTRY, page 491, we were interested in noting the question on acid-resistant floors and the answer given to it.

We thought you might be interested in knowing that large chemical companies often use sheet lead on the floors of their plants where there are liable to be spills of acid. There are several reasons for the use of lead. It is highly resistant to attack by acid and being non-porous any spilled acid can readily be cleaned up. It reduces noise and presents a comparatively slip-proof surface. In explosives manufacture, as well as being used for acid resistance it serves another purpose, that is, since a spark cannot be struck from it the explosion hazard is reduced. Should the floor ever have to be removed lead has a comparatively high scrap value.

LEAD INDUSTRIES ASSOCIATION,
Robert L. Ziegfeld.

New York City.

## George E. Abbott, Pioneer

Editor, METAL INDUSTRY:

George E. Abbott, president and founder of the Abbott Ball Company, Hartford, Conn., passed away on January 1st of this year. (See page 82.)

It seems to me, in view of the years of painstaking effort and the thousands of experiments he made and tests he ran in connection with the problems relating to the finishing of metal products of every kind, that his passing deserves more than just the average obituary.

Certainly the metal finishing trades, both workmen and owners alike, owe a great and lasting debt of gratitude to George E. Abbott. What we now like to term "research" work is an old story to him, because, to my own personal knowledge over a period of almost twenty years, the problems of the American manufacturer and workman were also his problems, and he strove mightily in an effort to find solutions that would make the road a bit easier to travel for the other fellow. Generally without compensation, and many times the effort not even casually appreciated, yet he carried on,—be it to his everlasting credit.

He was, as you know, my competitor, but he was more than that; he was my friend, and no one ever had a better one. Always generous in his counsel and advice, ever helpful in every way, absolutely fair, an ideal host and always a welcome guest.

It is a pity that more of the active workers in the metal fields could not have known him personally, for if they had, his passing would be to them, as it surely is to me, a very deep sorrow.

H. LEROY BEAVER.

Philadelphia, Pa.

## Plating Name Plates

Editor, METAL INDUSTRY:

In reference to your Shop Problem No. 5,062, in the December, 1931 issue:

I am engaged in plating this class of work, and the difficulty outlined in the question interests me, so I shall give my view as to the matter.

I am using with success a solution having the same proportions as the analysis of their solution shows. I use the solution on name plates, and I am of the opinion that the plates should go directly into the solution, without running through a strike. It is the striking that causes the plate to peel when it is engraved. Of course, an efficient cleaner must be used before plating.

WILLIAM WRIGHT.

Richmond, Ind.

# Technical Papers

**Analysis of Silver-Plating Solutions.** Bureau of Standards Journal of Research, November, 1931. Available from the Bureau at Washington, D. C.

Progress in the science of metal deposition, for example, in electroplating, is often dependent upon the control of the composition of the solutions by chemical analysis. Methods for the analysis of silver cyanide plating solutions were critically studied in a recent investigation at the Bureau of Standards, and a complete outline of analytical methods has been prepared, which may be applied to maintain proper working conditions in such electroplating baths. These methods will also be useful in research and development work on the electrochemistry and technology of silver deposition.

The determination of alkali cyanide by the Liebig method of titration with silver nitrate has been shown by electrometric titration to be correct to within 0.2 per cent. The addition of potassium iodide improves the accuracy and also corrects for the effects of impurities in the baths. By an electrometric method it was shown that the Hannay (mercuric chloride) titration for alkali cyanide is equivalent to the Liebig, but that the visual end point of the former is in error.

The applicability to silver-plating solutions of known methods for the separation and determination of silver, carbonate, iron, copper, and mercury was tested and satisfactory procedures were evolved for these constituents. Methods for total cyanide, total effective cyanide, and chloride were developed. A new method for the determination of ammonia in cyanide solutions was devised, furnishing a means for the quantitative control of this constituent, to which thus far little attention has been paid.

**Zinc and Its Alloys.** Bureau of Standards, Department of Commerce, Washington, D. C., 214 pages, available from Supt. Documents, for 70 cents.

Abstract:—The physical and mechanical properties of zinc summarized from the technical literature, together with the results obtained at the bureau, are given. Special consideration has been paid to the effect of structural condition of the metal resulting from impurities and from such factors as mechanical working, recrystallization, etc., upon the measured physical properties. The corrosion resistance of zinc, especially as related to its usefulness as a protective coating for steel, is discussed. The various alloy systems are summarized from the standpoint of constitution. Particular attention is given to the die-casting alloys and the properties which determine their usefulness industrially. A rather complete bibliography is included in the form of selected references appended to the various sections in which the different properties are discussed.

**American Society for Testing Materials,** 1315 Spruce Street, Philadelphia, Pa., has issued the following:

INDEX OF STANDARDS AND TENTATIVE STANDARDS, 1931; free on

request. This is designed for both those familiar with the standards and those not. It is a very convenient reference.

CORROSION OF IRON AND STEEL. Report of Committee A-5. Includes materials on galvanized coatings, embrittlement, and bibliographies on these subjects. 67 pages; 50 cents.

**Corrosion of Cast Aluminum Alloys,** by W. O. Kroenig. Scientific-Research Institutes of the Supreme Council of National Economy, Moscow, U. S. S. R. Transactions of the Central Aero-Hydrodynamical Institute, No. 91. (Russian text; English summary.)

Studies in a variety of alloys, including duralumin (Al 96, Cu 4), and alloys containing magnesium, manganese antimony.

**Porosity of Electroplated Chromium Coatings,** by W. Blum, W. P. Barrows and A. Brenner. Research Paper 368, Bureau of Standards, Washington, D. C. Supt. of Documents; 10 cents.

Various methods for detecting porosity of chromium coatings were found to yield consistent results. Very thin deposits contain round pores. As the thickness is increased the porosity decreases to a minimum, after which an increase in thickness is usually accompanied by the formation of cracks, either parallel or random.

The well-known copper deposition method for detecting the porosity depends upon the fact that copper will deposit only in pores or cracks and not on the chromium. This test was made semiquantitative by measuring either the average apparent current density or the weight of copper deposited in two minutes at 0.2 v. The following conclusions are based on such measurements. Their practical significance will be determined by exposure tests now in progress.

The porosity usually increases on standing. This increase is accelerated by heating to 200° C. Changes in the composition of the solution have no marked effect on the porosity. An increase in the temperature of deposition, for example to 65° C., instead of the usual temperature of 45° C., greatly decreases the porosity, especially of thick coatings. At any given temperature the porosity is increased by raising the current density.

Deposits on nickel are less porous than those on other base metals. This difference is at least partly due to the greater ease of securing a bright finish on nickel prior to the chromium plating.

**Straight Copper-Lead Alloys vs. Leaded Solid-Solution Bronzes for Heavy-Duty Bearings,** by F. R. Hensel and L. M. Tichvinsky. American Society of Mechanical Engineers, 29 West 39th Street, New York City.

This paper describes the metallurgical investigation of various bronze bearing metals and deals with a comparative study of the bearing performance of those metals. The technological possibilities of producing heavy-duty bearings were investigated. Experimental installations of bearings with severe requirements are under trial.

**Passage of Gas Through the Walls of Pyrometer Protection Tubes at High Temperatures,** by W. F. Roeser, Bureau of Standards, Washington, D. C. Supt. of Documents; 5 cents.

# New Books

**Patent Law for the Chemical and Metallurgical Industries.** By A. W. Deller. Published by the Chemical Catalog Company, New York. Size 6 x 9; 483 pages. Price $6.00.

The recent rise of litigation in the electrochemical industries has stimulated the interest of everyone engaged directly or indirectly in these fields, in patent law. Unfortunately it is a very abstruse subject which has always presented the aspects of a closed book to the layman. For that reason this work is welcome as the author has formulated it to give information on patent law to chemists and metallurgists rather than to lawyers and to provide a working basis for use in handling patent matters.

Some of the outstanding chapters are as follows: Classes of Patentable Inventions; Persons Entitled to Letters Patent; Remedies for Defective Patents; Infringement of Letters Patents; Commercial Basis of Patents; Foreign Patents.

The book is a useful assistant to the bewildered non-legal person enmeshed in the tangle of legal matters. Any aid which can be given to the troubled patent field is welcome.

**Handbook of Business Administration.** Edited by W. J. Donald. Published by McGraw-Hill Book Company. Size 4½ x 7; 1,753 pages. Price $7.00.

This handbook has been sponsored by and published for the Amercian Management Association. It is an encyclopedia of the best current managerial practice in all departments of business. The various sections have been prepared by authorities in these specialties, and it is put forth as a concise handy summarization for reference or study of the management policies and technique of many of our business leaders.

The handbook is divided into six sections; Marketing, Financial Management, Production Management; Office Management, Personnel Management and General Management. In these sections are chapters describing in detail different divisions of these departments of business, such as market research and analysis, advertising, merchandising, price policies, sales quotas, supervising the sales force, sales promotion, financial planning and control, corporate financing, depreciation and obsolescence, insurance, plant layout, machinery and equipment, research development and financing, production control, incentives and wage payments, purchasing, job analysis, training and education, collective bargaining, employee representative.

**Industrial Electrochemistry,** by C. L. Mantell. Published by McGraw-Hill Book Company, New York. Size, 6 x 9; 528 pages. Price $5.

While this book was written as a text for students and as a book of information for those interested in electrochemical processes there is much in it that is of value to the electroplater. There are 110 pages that should be read and studied by every electroplater. Whatever difference in opinion there may be regarding some processes, it should be overlooked as the author relied upon the best possible source of information.

The whole story of the electrodeposition of metals is given briefly and tersely. It is seldom that one finds as much informative material so well told. The author has a remarkable grasp of not only the methods used but also of the fundamental principles of the processes involved.

The electroplating industry is indebted to this text for placing the story of electroplating so well before the student and the engineer as they will have a better comprehension of the problems of the electroplater. That will bring the technical man and the practical plater closer together and this is needed today so that processes can be standardized and rational specifications for electrodeposits compiled.—GEORGE B. HOGABOOM.

## Government Publications

**Proposed Federal Specification WW-P-451, on Plumbing Fixtures** (for shore purposes). Federal Specifications Board, Washington, D. C. Manufacturers and others interested are requested to comment within 10 weeks after January 30. Copies on request to the Board. Also, Proposed Revision, Part of F.S.WW-P-378 for **Seamless Copper Pipe,** standard iron pipe size; Proposed Revision, F.S. No. 374, for **Admiralty Metal Condenser Tubes and Ferrule Stock.**

# Shop Problems

## This Department Will Answer Questions Relating to Shop Practice.

SOLUTIONS SENT FOR ANALYSIS MUST BE PROPERLY PACKED, TO PREVENT LEAKAGE AND BREAKAGE. LABEL ALL BOTTLES WITH NAME AND ADDRESS OF SENDER. MAIL ALL SAMPLES TO 116 JOHN STREET, NEW YORK.



### Black on Zinc

Q.—Would appreciate your advising what will oxidize or stain zinc. We have some zinc plates with high lights and would like to darken the backgrounds.

A.—The following formula will produce a black color on zinc:

Nickel chloride, 4 oz.
Ammonium chloride, 6 oz.
Ammonium sulphocyanide 2 oz.
Zinc chloride, ½ oz.
Water, 1 gallon.

Use the solution at 100°F. Immerse the work until a black color is obtained. The highlights may be relieved by using a small rag wheel with pumice and water.

O. J. S., Problem 5,061.

### Barrel Nickel Plating

Q.—We are sending you two samples of work of which we do a great quantity. We nickel plate these in a barrel plater, but the work comes out dull and does not take a plate on the inside.

Could you tell us how to plate these cups on the inside, so they will be bright? Also, send us a formula for a good bright nickel solution. What can we use for a brightener in our barrel nickel solution?

A.—You should have no difficulty in nickel plating the samples submitted, providing the nickel solution is in proper operating condition, and proper current density is used.

The conductivity of the solution that these samples were plated in is very poor. The solution can undoubtedly be corrected so that it will operate satisfactorily, and if you will send us a sample, we will analyze it for you.

Cadmium chloride is probably the best brightener to use for this class of work, but care must be used to avoid an excess.

If you wish to make a new nickel solution, we would suggest the following formula:

| | |
|---|---|
| Double nickel salts | 8 oz. |
| Single nickel salts | 8 oz. |
| Boric acid | 3 oz. |
| Sodium chloride | 3 oz. |
| Water | 1 gallon |

O. J. S., Problem 5,062.

### Cleaning Copper Coins

Q.—Please advise of a method of cleaning copper coins, some of which are corroded with verdigris, some just blackened. We desire a process which does not eat further into the metal, but leaves it smooth,—not necessarily bright. However, if brightening can be accomplished without considerable extra trouble, we would appreciate your telling us how to do that too.

A.—The corroded and tarnished copper may be cleaned by using a strong solution of sodium cyanide. Use 6 to 8 ounces of sodium cyanide to a gallon of water. If used hot, the results will be faster than if used cold.

Apply the solution with a tampico brush, and when tarnish is removed, wash with clean cold water, then with hot water, and dry.

The cyanide solution is very poisonous, and care should be taken when using this chemical.

O. J. S., Problem 5,063.

### Defective Nickel Plate

Q.—I am sending to you several nickel-plated parts. You will notice that these parts are badly discolored or stained. Will you kindly give these pieces an examination and let me have your best opinion as to the cause of the stains.

These pieces were in use only thirty days. It is very unusual to have plated work returned to us in this condition. Please notice that the parts are all from the top of the machine of which they are a part, the other parts remaining in good condition. Similar pieces remaining in stock are in good condition.

Our plating solution consists of double nickel salts, single nickel salts, chloride of sodium and boracic acid. Occasionally we use a small quantity of hydrogen peroxide. Brass pieces which were buffed though did not leave our factory in that condition.

A.—After a careful examination of the samples submitted, we are of the opinion that the tarnish and corrosion is due entirely to the operator of the machine. The parts that are worn through have either received less nickel plate, or the nickel has been removed in the nickel coloring operation.

If the parts are examined closely it will be seen that the surfaces that come in contact with the machine operator's hands are affected, while the surfaces of the parts that do not come in contact with the operator's hands are not tarnished. It is a known fact that some persons perspire more freely than others, and it is also known that the perspiration of some persons has a more decided corrosive action than that of others.

If you will look into this matter carefully, we are sure that this is where you will find the trouble.

O. J. S., Problem 5,064.

### Drying Sterling Silver

Q.—How can I dry sterling silver? Please give solution and process.

A.—Had you mentioned the class of sterling silver ware that you wished to dry, we could undoubtedly give you the method in detail.

One method is to use denatured alcohol as a dip solution before drying the work with a cloth or hot air blast. Another method is to use compressed air and blow the water off.

If either of these methods will not do, let us know the class of work that you wish to dry and we will advise you further.

O. J. S., Problem 5,065.

## Gold and Silver Plate

Q.—In the plating of musical instruments, we are using silver anodes that are 98% pure and the same metal for our chlorides. In gold plating we use 14 karat gold for anodes and 24 karat gold for chlorides.

What we wish to find out is what we can do to cause a harder deposit. It seems that the gold and silver as deposited on our instruments is a bit too soft, and we would like to know what current, heat and chemical conditions have a tendency to increase the hardness of the deposit.

Is there any chemical we can put into our solution, or is there any silver or gold alloy that we can use, that will give us a harder plate?

A.—The factors that produce a fine crystal deposit are low temperature and low current density. Addition agents that are added to the solution to produce a bright deposit also produce a deposit with fine crystals. A fine crystal deposit is harder than a coarse crystal deposit.

For the gold solution we would suggest the use of as low of a temperature and also as low a current density as can be used.

The use of nickel anodes in the gold solution instead of the 14 karat anodes will also produce a harder deposit, but the color of the deposit will be somewhat lighter. With the use of nickel anodes the gold content of the solution must be maintained by the addition of a gold salt to the solution.

For the silver solution we would suggest the use of a brightener, and carbon bisulphide is the best. In preparing the brightener place one quart of the silver solution in a 2 quart bottle and add 8 ounces of sodium cyanide. When the cyanide is dissolved, add 1 ounce of carbon bisulphide and 1 ounce of ether. Shake the bottle from time to time until the carbon bisulphide is dissolved, and then filter. One ounce of this solution is enough to add to each 15 gallons of the silver solution. Care should be used to avoid using an excess, but should an excess be added, it may be removed by heating the solution to 140°F., and maintaining this temperature for several hours.

O. J. S., Problem 5,066.

## Metal Mold Lubricant

Q.—Can you give me any information as to what kind of a lubricant is used in casting brass or bronze in metal molds?

A.—One of the best coatings we have found for coating metal molds for brass is acetylene gas smoke. Another that has been found good for metal molds is "oildag," or "prodag B." In our experiments this material shows much promise. We found it very good for molds for casting aluminum. However, the acetylene gas gives very good results. Just take the acetylene gas, make a smoky flame and play on the mold.

W. J. R., Problem 5,067.

## Plating Costs

Q.—We would appreciate some information on the economy of plating copper and brass in comparison with plating steel or iron. We understand that it is less expensive to prepare the surface of copper and brass than ferrous metals. In the case of chromium plating copper and brass, nickel is applied and then chromium; whereas, in chromium plating ferrous metals copper and nickel, and sometimes another layer of copper and nickel are applied before the chromium. As these operations represent expense, it would seem that there would be a point where the extra cost of finishing and plating operations for ferrous metals would make the total cost of the finished product greater than the cost of the same product made of copper or brass.

Any suggestions you may be able to obtain for us on how to get at the facts will be greatly appreciated.

A.—While the cost of the base metal in the manufacture of any article is an important factor in the cost, there are other factors that also enter into the cost of the product, such as labor in the fabricating and finishing operations.

Usually, brass or copper can be finished with less labor than the ferrous metals, and especially is this so where the finished product is subject to atmospheric corrosion. There are many articles that cannot be made of the non-ferrous metals, and here the use of the ferrous metals is desirable for their characteristic properties regardless of their finishing costs.

Many small articles that are made of the ferrous metals can be finished just as cheaply as if they were made of either brass or copper, where mechanical means are employed, and the finish is just as good, with a saving in the cost of the base metal.

The manufacturer generally knows whether it is cheaper to use a non-ferrous metal, with less labor cost, than a ferrous metal with greater labor cost in finishing his product. The difference between the cost and the selling price of an article is what the manufacturer is interested in. It is our opinion that the base metal used in any manufactured product depends greatly upon what the product is to be used for, and both the ferrous and the non-ferrous metals have very necessary places in our industries.

O. J. S., Problem 5,068.

## Replating Pewter

Q.—Please advise how to replate pewter articles, such as pitchers, trays, etc., which require silver plating.

A.—In replating pewter ware, the first operation is to remove the old deposit of silver. This is accomplished by using an electro-cyanide strip made of sodium cyanide 8 to 10 oz., water 1 gallon. Agitation of the work while stripping is recommended.

After stripping, pickle in a hot muriatic acid dip to loosen or remove oxidation. Then scratch brush and polish.

In silver plating, two silver strike solutions are used. The first strike solution contains a very small amount of silver and a large amount of free cyanide, and can be made by using 10 oz. sodium cyanide and ¼ oz. silver cyanide or silver chloride to each gallon of water. The second, or regular, strike is made by using 8 oz. sodium cyanide and ¾ oz. silver cyanide or silver chloride to each gallon of water.

The silver solution is made of silver cyanide 3 oz., sodium cyanide 6 oz., sodium carbonate 2 oz., water 1 gallon.

Six volts should be used with the strike solutions, and one volt with the silver solution.

O. J. S., Problem 5,069.

## Rust Preventive

Q.—To prevent gray iron castings from rusting, I am using a mixture of soluble oil—one part in four of mineral oil—that is added to a strong soda water solution (soda ash and water). However, occasionally the castings rust anyway. Perhaps you can suggest some simple chemical addition?

A.—A good solution can be made up of 1 pound sal soda (carbonate of soda), 1 quart of lard oil, 1 quart of soft soap and enough water to make up 10 or 12 gallons. The mixture is boiled for a half hour, preferably by the use of a steam coil. If the smell of this solution is objectionable, add about 2 pounds of unslaked lime. P. W. B., Problem 5,070.

## Yellow Brass

Q.—We have difficulty producing good yellow brass castings. We should like the brass to be as yellow as that used in the old foundries, when the castings were extremely yellow with a greenish tint.

A.—Yellow brass that gives the yellow color and at the same time is not brittle is composed of copper and zinc in the proportions of 60—40, 70—30 or 80—20, the larger proportion being copper in each case. The 60—40 is extremely yellow; 70—30 is not quite so yellow; 80—20 is a light yellow. We advise that only new metal be used, and that the mold be skin dried.

Brass with over 60% zinc is far too brittle for ordinary commercial work, but where brittleness is immaterial such metal finds industrial application in casting ornaments, statuettes, fancy buttons, etc. Such castings may be in sand or chill molds; owing to the repetitive character of the work the latter type of mold is usually employed. Composition ranges as follows: copper 40, zinc 60, copper 20, zinc 80, copper 10, zinc 90. These castings are called "artificial bronze," and a series of tones varying from olive green to chocolate may be obtained by little experiment with the above mixtures. W. J. R., Problem 5,071.

# Patents

## A Review of Current Patents of Interest

**Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.**

1,831,309. November 10, 1931. **Electrodeposited Core Box.** Arthur K. Laukel, Detroit, Mich.

The process of producing a metal core box having special provision for protection against burring, which consists in utilizing a mold having a raised pattern thereon in counterpart of the core box to be produced, plating the mold around the margins of the raised pattern with a relatively hard metal whereby such hard metal will extend into the angles between the raised pattern and the surface of the mold, and thereafter plating the hard metal deposit and the raised pattern with a relatively soft metal.

1,831,584. November 10, 1931. **Light Metal Alloy.** Johann Weiss, Vienna, Austria.

A light metal alloy consisting of aluminum, 12 to 18 parts by weight of copper, 0.1 to 5.00 parts by weight of magnesium, 0.1 to 5 parts by weight of nickel, the total sum being 100 parts by weight.

1,831,987. November 17, 1931. **Magnesium-Tin-Zinc Alloys.** Robert Thomas Wood, Lakewood, Ohio, assignor to American Magnesium Corporation, Pittsburgh, Pa.

An alloy consisting of magnesium, tin, and zinc, the tin content varying from about 1 to 15 per cent, the zinc content varying from about 0.1 to 10 per cent, the balance of the alloy being magnesium.

1,832,386. November 17, 1931. **Process for Separating Tin from Alloys.** Albert Hanak, Philadelphia, Pa.

The process of separating tin from white metal alloys which comprises in causing chlorine gas to pass through the molten alloy at an elevated temperature in presence of metallic sulphides to form stannic chloride.

1,832,653. November 17, 1931. **Zinc Base Alloy and Wrought Products Made Therefrom.** Willis M. Peirce and Edmund A. Anderson, Palmerton, Pa., assignors to New Jersey Zinc Company, New York.

A zinc base alloy consisting principally of zinc and containing about 0.5 per cent cadmium and about 0.5 per cent lithium and capable of being mechanically worked to produce wrought products possessing superior resistance to cold flow.

1,832,733. November 17, 1931. **Zinc Base Alloy and Wrought Products Made Therefrom.** Willis M. Peirce and Edmund A. Anderson, Palmerton, Pa., assignors to The New Jersey Zinc Company, New York.

A zinc base alloy consisting principally of zinc and containing from 0.05 to 2 per cent copper and from 0.005 to 0.5 per cent lithium.

1,832,979. November 24, 1931. **Method of Cleaning Metals.** Harry S. George, Massapequa, N. Y., assignor to Electro Metallurgical Company, a Corporation of West Virginia.

The method of cleaning oxide films from metal articles which comprises coating the articles with a substance comprising a pyrophosphoric acid containing less than 0.3800 and more than 0.1267 parts by weight of molecularly combined water per part of $P_2O_5$, heating to free the films from the metal, and removing the freed films and the excess of cleaning substance.

1,832,992. November 24, 1931. **Zinc Alloy.** Henry J. Lorang, St. Louis, Mo., assignor of one-half to Frank J. Kuna, St. Louis, Mo.

The method of making a zinc alloy which consists in forming a fixed metal by combining equal parts by weight of copper and zinc, and then combining said fixed metal with aluminum and zinc in substantially the proportions of one ounce of the fixed metal to fourteen ounces of zinc and one-half ounce of aluminum.

1,833,076. November 24, 1931. **Process for the Manufacture of Aluminum and Aluminum Alloys.** Ture Robert Haglund, Stockholm, Sweden.

A process for the manufacture of aluminum and aluminum alloys from aluminum-oxide and aluminum-oxide containing materials consisting in first producing from the same under the addition of tungsten containing the substances by means of an electrothermic reducing smelting treatment a tungsten aluminum alloy and separating from this alloy by cooling a tungsten freed aluminum and leaving a tungsten aluminum alloy in a solidified state, which is enriched in tungsten.

1,833,422. November 24, 1931. **Cadmium Plating Bath.** Chad H. Humphries, Indianapolis, Ind., assignor to James C. Patten, Indianapolis, Ind.; E. Kirk McKinney special administrator of said James C. Patten, deceased.

That improvement in the art of cadmium plating which involves the inclusion, in an appropriate bath containing cadmium oxide and sulphuric acid, in the approximate proportions of 2½ ounces of cadmium oxide and 6 ounces of sulphuric acid per gallon of water, of 1 to 10 grams of commercial cane sugar caramel.

1,833,423. November 24, 1931. **Composition for Cadmium Plating Baths.** Chad H. Humphries, Indianapolis, Ind., assignor to James C. Patten, Indianapolis, Ind.; E. Kirk McKinney special administrator of said James C. Patten, deceased.

A composition of matter adapted for use in forming an acid solution for the electrodeposition of cadmium consisting of substantially three ounces of sulphuric acid, two to eight ounces of aluminum sulphate, ten to twenty ounces of sodium sulphate, two to five ounces of cadmium salts containing oxygen and ten grams of a brightener.

1,833,450. November 24, 1931. **Cadmium Plating Bath.** Arthur W. Young and George H. Stinson, Detroit, Mich., assignors to James C. Patten, Indianapolis, Ind.; E. Kirk McKinney special administrator of said James C. Patten, deceased.

An acid solution for cadmium plating purposes containing, per gallon of water, a cadmium content of not more than six ounces, a sufficient amount of sulphuric acid to combine with the cadmium content and to provide an excess of from one to ten ounces of sulphuric acid, the cadmium sulphate content of the bath being the predominant metal content thereof and from one to ten grams of an animal glue.

1,833,683. November 24, 1931. **Metallurgical Process.** Ralph F. Meyer, Freeport, Pa., assignor to Meyer Mineral Separation Company, Pittsburgh, Pa.

A process of recovering metals from ores containing or admixed with sulphur comprising roasting the ore at a temperature below about 525° C. to oxidize a portion of the sulfur, cooling to normal temperature, treating the cooled ore with steam to hydrate it, then drying the hydrated ore while retaining the hydrates therein and then roasting it to oxidize a further portion of sulfur, subsequently extracting metal values from the thus-treated ore.

1,833,684. November 24, 1931. **Metallurgical Process.** Ralph F. Meyer, Freeport, Pa., assignor to Meyer Mineral Separation Company, Pittsburgh, Pa.

A process of chloridizing metal values in ore, comprising rendering the finely divided ore quasi-wet with liquid, and while maintaining the ore quasi-wet treating it with sulfur dioxide and with chlorine in repeated alternation.

1,834,203. December 1, 1931. **Process of Producing Metal Articles Electrolytically, Particularly Sheets.** John R. Cain, Washington, D. C., and Gibson Yungblut, Dayton, Ky., assignors to The Richardson Company, Lockland, Ohio.

A process for forming iron pieces which consists in starting with a plate of iron, plating the plate with soft electrolytic iron, cold rolling the plate, and then dividing the cold rolled product to provide at least one cathode plate, with a remainder piece over, and repeating this process using the cathode plates produced in each step, with an intermediate annealing to restore grain structure.

1,834,812. December 1, 1931. **Metallizing or Coating Substances with Metals.** Albert Ivan Gates Warren, London, England, assignor to British Metallising Company, Limited, London, England, a Company of Great Britain.

A method of coating electrically non-conducting material with a metal, which consists in coating the surface of said material with a metallic salt and a powderous metallic precipitate of a similar metal, subjecting the surface to a metallic salt reducing agent, and drying the surface.

1,835,113. December 8, 1931. **Protective Coating for Metal Surfaces.** Charles V. Iredell, Bloomfield, N. J., assignor to Westinghouse Lamp Company, a Corporation of Pennsylvania.

The method of protecting metal surfaces from corrosion by atmospheric gases which comprises coating the surface with a film of fused boron anhydride.

1,835,205. December 8, 1931. **Alloy Composition.** Michael George Corson, Jackson Heights, N. Y.

An alloy composition consisting mainly of silver and aluminum the amount of the first being from 65 to 80 per cent and of the second from 20 to 35 per cent.

1,835,244. December 8, 1931. **Manufacture of Aluminum Silicon Alloys.** Hans Schorn, Lautawerk-Lausitz, Germany.

The method of producing aluminum silicon alloys according to an uninterrupted electrolytical melting process of manufacturing aluminum in a fluoride bath without reduction of silicic acid, consisting in modifying the said process by adding to aluminum in the nascent state, uncombined silicon in an amount in accordance with the desired proportion thereof in such alloy, whereby the resulting product becomes a fine-grained alloy.

1,835,450. December 8, 1931. **Wrought Zinc Product.** Edmund A. Anderson and Elihu H. Kelton, Palmerton, Pa., assignors to The New Jersey Zinc Company, New York.

The method of improving the physical properties of a wrought zinc product made from a zinc base alloy capable of being worked into a wrought product possessing marked resistance to cold flow, which comprises subjecting the wrought product to heat treatment characterized by rapidly heating the wrought product to an elevated temperature of about 300° C., and maintaining the wrought product at that temperature until the contemplated improvement in its physical properties has taken place.

1,835,643. December 8, 1931. **Apparatus for Plating Small Articles.** Leslie E. Frost, Wilkinsburg, and Byron V. McBride, Irwin, Pa., assignors to Westinghouse Electric and Manufacturing Company.

An apparatus for electroplating a large number of small articles comprising a tank adapted to hold a suitable electroplating solution, a perforated metal basket for holding said articles, said basket being insulated from the galvanic action of the bath except at those portions which come in contact with the articles to be plated, the uninsulated portion of the basket, together with said articles forming the cathode, and an anode having a surface conforming to the contour of the articles to be plated and extending into said basket.

1,835,679. December 8, 1931. **Chromium Plated Article.** Clarence Van Derau, Mansfield, Ohio, assignor to Westinghouse Electric & Manufacturing Company, a Corporation of Pennsylvania.

A chromium-plated article having a foundation metal comprising an alloy containing tin, an electrodeposited layer of cadmium on the foundation metal, an outer layer of chromium, and a layer of nickel interposed between the layer of cadmium and the layer of chromium.

1,835,965. December 8, 1931. **Brazing Flux.** John J. Phelan, Troy, N. Y., assignor to General Electric Company, a Corporation of New York.

A flux consisting mainly of potassium acid fluoride but containing appreciable quantities of boric acid and potassium carbonate, the quantity of boric acid present in the flux being at least equal to the quantity of potassium carbonate.

1,836,066. December 15, 1931. **Electroplating Apparatus.** Thomas A. Edison, West Orange, N. J., assignor to Thomas A. Edison, Incorporated, West Orange, N. J.

In an electro-plating cell, a cathode comprising a disc mounted above the plating bath for rotary movement about an inclined axis and a holder for a member to be plated carried by said disc so that in each rotation of the latter said member is adapted to be immersed in and withdrawn from said bath, substantially as described.

1,836,317. December 15, 1931. **Corrosion Resistant Alloys.** Russell Franks, Jackson Heights, N. Y., assignor to Electro Metallurgical Company, a Corporation of West Virginia.

An alloy comprising molybdenum 15% to 25%, chromium 10% to 20%, iron 5% to 15%, tungsten approximately 5%, an appreciable amount of carbon but not over 0.2%, and the remainder principally nickel, at least 40% of nickel being present.

1,836,401. December 15, 1931. **Composition of Matter for Welding Copper and Steel.** Emanuel J. Schaffner, Minneapolis, Minn.

A flux for use in joining copper to iron or iron alloys including a material mixed with borax and copper sulfate, said material including copper, zinc and lead mixed while in a molten state and subsequently cooled and reduced to a finely comminuted state.

1,836,579. December 15, 1931. **Method of and Apparatus for Electroplating Pipe.** Sidney H. Davis, Carl O. Anderson, and Rudolph J. Stengl, Baxter Springs, Kans., William N. Smith, Platteville, Wis., and Herbert R. Hanley, Rolla, Mo., assignors to The Century Zinc Company, a corporation of Ohio.

The method of electroplating a ferrous pipe with zinc on its inner and outer surfaces simultaneously which comprises the steps of supporting the pipe in an electrolytic bath with one of its ends higher than the other, passing a current between the outer surface of the pipe and an anode insoluble in the electrolyte, simultaneously passing a current between the inner surface of the pipe and an anode disposed therein and also insoluble in the electrolyte and effecting relative longitudinal movement between the internal anode and the pipe while said currents are passing.

1,836,598. December 15, 1931. **Process of Chromium Plating.** Chad H. Humphries, Indianapolis, Ind., assignor to Metals Protection Corporation, Indianapolis, Ind.

The process of chrome plating which comprises plating a heavy base coat at a temperature at which the current efficiency is high but a dull finish results and then lightly plating the so-called article at a temperature at which a bright finish is normally obtained whereby the plated article is given a satin finish.

1,837,112. December 15, 1931. **Method of Galvanizing.** Eugene L. Chappell and Paul C. Ely, McKeesport, Pa., assignors to National Tube Company, a Corporation of New Jersey.

The method of producing a corrosion and chemically resistant surface on galvanized ferrous metal which consists in coating said ferrous metal with molten zinc, and then cooling the zinc coated metal while still hot by immersing said metal in a solution of a chromate salt.

1,837,432. December 22, 1931. **Purification of Metals and Alloys.** Albert Hanak, Philadelphia, Pa.

The process of purifying impure copper or copper alloy which comprises treating said copper or copper alloy in the molten state with a metal of the group comprising alkali and alkali earth metals and contacting at the same time said copper or copper alloy with a layer of a molten alkali under reducing conditions.

1,837,835. December 22, 1931. **Process for Electrodepositing Bright Nickel.** Walter L. Pinner, Detroit, and Clyde C. De Witt, Ypsilanti, Mich., assignors, by mesne assignments, to General Spring Bumper Corporation, a Corporation of Michigan.

An electroplating bath for depositing bright nickel comprising a solution of the following ingredients in the proportions mentioned per gallon of water: 1.75 lbs. nickel sulphate; 0.209 lb. nickel chloride; 0.238 lb. boric acid; 0.437 lb. citric acid; 0.067 oz. basic lead carbonate; the bath, after complete solution of the foregoing constituents being neutralized to a pH value of 6 by adding thereto approximately 0.41 lb. of dry nickel carbonate per gallon, and after such neutralization, there being added to the bath hydrogen peroxide in sufficient quantity to oxidize any ferrous iron that may be present to ferric iron, and the resultant solution being filtered and acidified to a pH value of 5.2-5.6.

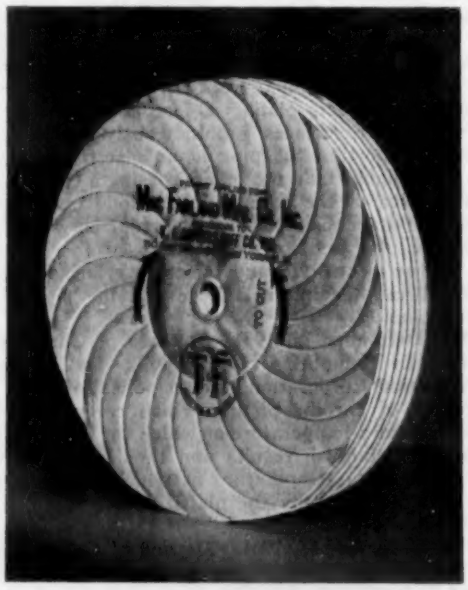
# Equipment

## New and Useful Devices, Metals, Machinery and Supplies

### New Polishing, Coloring and Cutting Buff

A polishing, cutting and coloring buff all in one has been developed and placed on the market by the Mac Farland Manufacturing Company, Inc., 110 East 42nd Street, New York. The maker states that it has been recognized as a buff of exceptional merit, since it eliminates a difficulty found in many types of buffs, lack of uniform density due to the manner of sewing. The new Mac Farland product is known as the "Blue Streak."

The manner of constructing a "Blue Streak" buff permits any degree of hardness to be obtained, and greatly increases the cutting and coloring efficiency. This type of sewing creates pockets and causes tripoli or polishing compounds to adhere more readily and be retained in larger quantities. Therefore, while increasing the cutting or polishing ability of the buff, the reduction in the ravel and the retention of the composition reduces waste of both composition and buff to a minimum, permitting increased production, it is claimed. Other features mentioned are uniformity of wear and ability to retain efficiency at a reduced diameter.



New "Blue Streak" Buff

In maintaining a uniform density, it is stated, the buff has no tendency to glaze, and this eliminates most entirely the necessity of raking while in use. The buff is accurately trued and faced when produced, and can be put in immediate use without raking or preparing.

An additional and unusual feature of the "Blue Streak" buff, the maker says, is that it can be run in one direction for cutting, and can be remounted and run in a reverse manner for coloring, this being possible because the buff as used for cutting is 60% more rigid than when used for coloring.

### Aluminum Solder

Allied Research Laboratories, Glendale, Calif., has placed on the market "Alumaweld," which is described as a solder which will repair aluminum, pot metal, die castings, cast iron and steel, strongly and permanently. According to the makers, "Alumaweld" has a tensile strength of 12,000 pounds. They state it breaks down the structure of the metal being repaired and fuses with it to form a perfect bond rather than providing only surface adhesion. Among successful uses of the material the makers list repair of blowholes in aluminum castings, in steam and water pipe systems, automotive cylinder heads and crank cases. Application is with soldering iron or blow torch. It is stated that the metal melts at a low temperature but that once applied it requires a temperature from 50 to 250 degrees higher to melt it again. Other claims made are that the solder will take a good polish and can be plated with chromium or other metal, that it will not corrode under ordinary circumstances, and that it cannot possibly rust. Complete information will be supplied to readers on application to the maker.

### Sodium Perborate

The many uses of sodium perborate for general oxidation work are discussed in detail in the new 16-page booklet. "Properties and Uses of R. & H. Sodium Perborate," just issued by The Roessler & Hasslacher Chemical Co., Inc., New York. In this booklet is contained information and data on the major industrial applications, physical and chemical properties, chemical reactions, methods of use and other features of sodium perborate.

R. & H. sodium perborate is a solid, stable powder ($NaBO_3 \cdot 4H_2O$) furnishing 9.5—10.0% of available oxygen. It can be dissolved in water, the resultant alkaline solution being easily controlled to give an efficient oxidizing liquor. Sodium perborate is an easily available oxidizing agent. It may be stored with safety, handled with ease, and its solutions are controlled readily. The use of perborate rarely calls for special equipment or highly skilled labor. It is used extensively in cleansers, mixed with soap, soda ash, etc.

The presence of 1/20 to 1/50 ounce of sodium perborate per gallon of nickel plating solution stops hydrogen pitting, according to information given in this new booklet. In the alkaline tin bath and sulphate zinc bath, pleasing white plate is produced through the presence of equally small amounts of perborate in the plating solution, it is stated.

### New Acid-Proof Cement

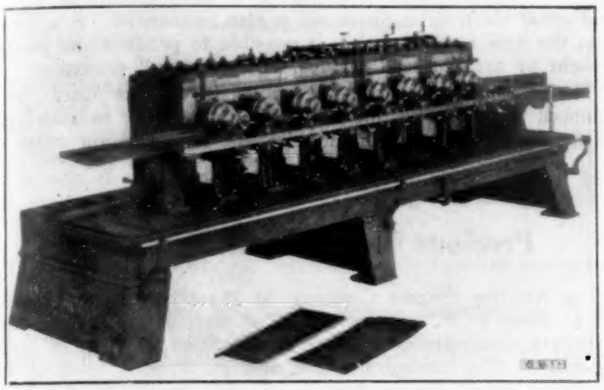
The Research Department of The United States Stoneware Company, Akron, Ohio, announces it has perfected "Pre-Mixt" acid-proof cement, in ready-mixed, powdered form. "Pre-Mixt" represents an entirely new principle and a radical departure from all other acid-proof cements, it is stated, combining the following features:

The hardened cement joints are thoroughly acid-proof and water-proof, without acid painting. It is used and handled in the same manner as ordinary portland cement,—mix with water on the job. No special technique necessary. This saves freight charges due to elimination of high water content in ordinary silicate of soda solutions. Hardening action is purely chemical and does not depend upon presence of air. Joints, therefore, harden all the way through. There is practically no expansion in the finished cement joint. The "mix-with-water-on-the-job" feature does away with wastage or spoilage such as occurs with drums of ordinary cement pastes, when opened. Sets fast; initial set is taken in about one hour, with complete set in about 24 hours.

Exhaustive tests have proven "Pre-Mixt" cement to withstand thoroughly the action of all acid and neutral solutions—weak or strong, hot or cold, hydrofluoric acid alone excepted, the makers state. The material recommended for use in the chemical, electrical and metallurgical industries, for such work as lining chemical storage tanks, pickling and galvanizing tanks, acid troughs and gutters, etc.

## Cold Roll Forming Machines

Kane and Roach, Inc., Syracuse, N. Y., have brought out a line of newly designed cold roll forming machines, known as the "Series L." The machines are stated to have been designed with a basic plan which permits maximum adaptability to any individual changes required for specific applications. Machines of this type have been adopted for use in the U. S. S. R. for hemming edges of "Ford" automobile running boards produced there. Being a single-purpose equipment this machine required no elaborate gearing. The machine has roller bearings through-



New Kane and Roach Cold-Former.

out, gears enclosed in oil-tight cases and operating in oil bath; silent chain drive from motor to clutch idling sprocket; removable hand crank with automotive type kickout; coolant pump; clutch shifter rod which can be operated from any point on front of machine; motor mounted on bracket on back of bed plate and easily accessible; oil-submerged worm drive.

Another machine of the "Series L" type has "square" gearing to cover a range of depth sections; outboard housings adjustable for width of sections; housings, coolant system, clutch mechanism and a number of other details practically the same as the machine described above.

The maker states that means is provided for recording pressure settings where several different sections are rolled on one machine, so that no time is lost in finding correct pressure for each shape when job change-overs are made.

Readers desiring full details should apply directly to the manufacturer.

## Alloy for Dairy Products

A new non-ferrous alloy combining strength and resistance to corrosion and tarnish with a facility of manufacture that makes it readily workable in all commercial forms has been announced by the Development and Research Department of The International Nickel Company, 67 Wall Street, New York. It was developed especially for dairy machinery. It is known as "Inco Chrome Nickel". It is a nickel base alloy low in iron and containing chromium. Tested under actual operating conditions it has shown high resistance to the tarnish of dairy products, brines and cleansing agents. It is being produced in the form of sheets, bars, tubes, and castings.

Production of the new alloy marks the completion of a long series of laboratory tests. Full scale equipment was manufactured in several plants, which involved the use of various forming methods and many types of seam. Fabricating methods used were suitable for sheets and plates from 24 gauge to ¾-inch thickness in any common shape. Seam types included electric and oxy-acetylene welding, brazing, and soldering. Units, such as a large positive holder, a vat pasteurizer for buttermilk, and a light gauge spray pasteurizer, were manufactured and put into actual service in dairy plants. These units have now been operated for a sufficient length of time to demonstrate their practical success, it is stated.

Announcement of this alloy represents a new step by The International Nickel Company, which has for some years limited its materials in the dairy field to pure nickel and Monel metal.

## Welding Electrodes

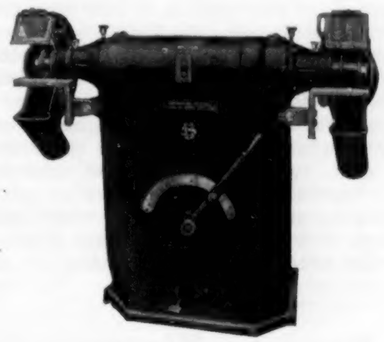
A new line of arc welding electrodes, which have a heavy all-mineral flux coating, has been placed on the market by the Metal & Thermit Corporation, acting as exclusive sales agents for the American Murex Corporation, who are the manufacturers. Both companies have offices at 120 Broadway, New York, N. Y.

The new electrodes, known as "Murex," are made 18 inches long and in types and sizes suitable for a wide range of horizontal, vertical, and overhead welding operations. A feature of the electrode is a patented spiral winding of asbestos yarn which serves to hold the heavy mineral flux to the core so that it is not injured if the electrode is bent. The manufacturers point out that the all-mineral ingredients of the flux on a "Murex" electrode causes it to burn without objectionable fumes or smoke, while the thickness of the coating enables the operator to ride the electrode on the work, thus letting the flux coating space the arc.

Among the eight types of electrodes in the "Murex" line there are electrodes for welding commercial mild steel, manganese steel, 18-8 stainless, and stainless iron.

## New Variable Speed Grinder

The United States Electrical Tool Company, 2462 West Sixth Street, Cincinnati, Ohio, announces a new model variable speed grinder in smaller sizes than has been hitherto available in this type of machine. Designated as "Model 64," the machine is made in sizes to accommodate wheels of 12, 14, 18 and 20 inch diameters, for 220 440, or 550 volts. 25, 30, 40, 50 or 60 cycle, 2 or 3 phase, alternating current. Features of the machine stressed by the manufacturer include ability to maintain constant wheel surface speed despite wheel wear; patented Gibbs V-disc transmission; hand lever and foot pedal for shifting speeds; high efficiency under long, heavy loads; positive action, free of back-



New Variable Speed Grinder by United States Electrical Tool Company.

lash; construction in accordance with the safety code of the American Engineering Standards Committee; motor built to standards of N. E. M. A., with 40° temperature rise; ball bearings throughout; push button control with no-voltage release.

The machines and full information are available from the manufacturer and from this maker's distributors in principal cities.

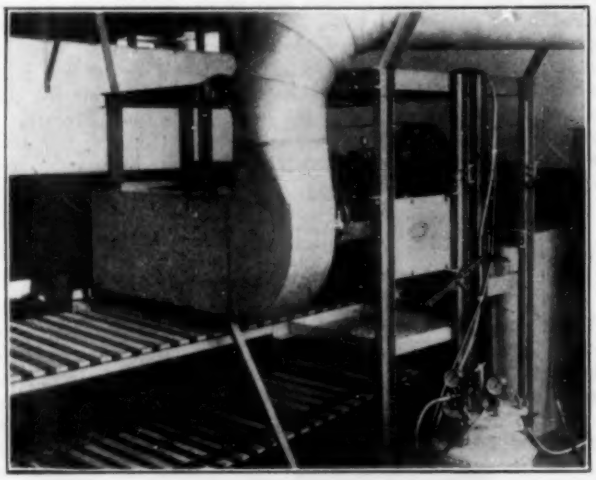
## New Aluminum Flux

Apex Smelting Company, Chicago, Ill., has perfected an aluminum flux that gives results superior to zinc chloride or other similar fluxes heretofore commonly used, it is announced by that company. It is stated that this flux not only cleanses aluminum of foreign ingredients, but dispels gases and oxides contained in the metal and absorbed in the melting practice. Its mechanical properties bring to the surface furnace, crucible or pot scale, entrapped drosses, and also liberates metallic aluminum from skimmings. It is smokeless, odorless, fumeless, and absorbs no moisture, it is claimed.

The flux is markeied by the Apex Smelting Company. It is called "Apex Aluminum Flux," and can be purchased on approval in any quantity desired. Two to four ounces is required to each 100 pounds of metal.

## Automatic Spraying Equipment

An automatic paint spraying or finishing machine for heavy production is being placed on the market by the Willard C. Beach Air Brush Company, 201-205 Second Street, Harrison, N. J. This machine, announced as the "Beach Automatic Spracoater" automatically spray finishes objects carried by a conveyor, or material fed from a roll. It can be adapted for a wide range of work and will prove of interest to those branches of the metal working industry engaged in the manufacture of steel furniture, refrigerators, sheet metal work, electrical equipment, stove and range parts, table tops, toys, instrument panels, metal buttons, etc, it is stated.



Beach Automatic Spraying Equipment

The design and construction of this machine is such that the spray gun, operating at high speed, passes back and forth over the work, shutting off automatically at the end of each stroke. The makers state that it produces a finish of uniform thickness, free from runs and "holidays," and reduces the waste of material to a minimum. The spray coating can be regulated or adjusted from a side control while the machine is in operation. By using two or more guns, two-tone, mottled and rainbow finishes can be obtained. Depending upon the number of guns used this machine has a coating capacity of between 40,000 and 100,000 square feet per day, it is claimed. The device is protected by U. S. patents and foreign patents are pending.

## Consulting Service on Mirrors

Peacock Laboratories, Inc., Bourse Building, Philadelphia, Pa., offer a consulting service in the technology of mirror manufacture, as well as in art glass, reflector and other specialty production in the glass and mirror industries. The concern has prepared a booklet, "A Text on Mirror Manufacture," by William Peacock, consulting engineer, who heads the company. It gives a highly illuminating discussion of mirror production and the various problems of this type of work. The booklet was prepared for Merck and Company, Inc., Rahway, N. J., manufacturing chemists.

## Ampco Metal, Inc.

A very large shipment of bronze castings was recently made by Ampco Metal, Inc., Milwaukee, Wis., producers of a special bronze for casting and other purposes. The big shipment weighed about 18,000 pounds, and consisted of the castings for special machinery which will be used to form hot welded steel sheet in pipe of large diameter. The bronze castings were reported to be made of an alloy containing no lead, zinc, tin or phosphorus. The metal contains pure copper with additions of aluminum and steel, giving a very hard alloy having characteristics which make it particularly suited to a number of purposes, according to available data.

## Gross Engineering in Larger Plant

The Gross Engineering Corporation, Cleveland, Ohio, has removed to a larger plant at 3954 West 25th Street, the premises formerly occupied by the The Gross Lead Burning and Coating Company. According to Louis Gross, president, the change was rendered necessary by the growing demand for this company's "Ledhesion" process of acid-proof lead-coating protection for metals subject to corrosion, this demand coming largely from the chemical and process industries. (The "Leadhesion" process was described in the issue of November, 1931, page 496.)

The production by a new method of lead anodes for plating and other electrolytic processes is also announced. It is stated that the new method makes it possible to produce any desired weight or area of lead anodes with increased economy.

The new plant has about 22,000 sq. ft. of floor space. It is equipped to do lead-coating and lead-burning work on autoclaves, coils, fans, anodes, etc., of any size, the announcement states.

## Precious Metal Encasing Process

The Aurilyte Process Company, 51 Waverly Avenue, Newark, N. J., offers to the jewelry and other precious metal using lines "Aurilyte Concentrates" for electrodeposition of precious metal encasings. The concentrates are used on aqueous solutions for producing bright, heavy deposits of such metals as white, red, green or 24-carat yellow gold, platinum, and palladium. Advantages of use of the material are stated to be economical and easy production of uniform deposits in a single operation, with low voltage and simple equipment. Complete operating information is supplied. While not to be confused with ordinary "coloring" processes, the makers state, the "Aurilyte" process can be used for flashings. Trial units are offered for tests on actual work.

Readers desiring complete information should apply directly to the company.

## Equipment and Supply Catalogs

**Economic Report.** Metropolitan Life Insurance Company, New York. Index of reports issued by the Policyholders' Service Bureau.

**Air Filters.** The Northern Blower Company, Cleveland, Ohio. Bulletin 500-1 on continuous operating, automatic, self-cleaning equipment, Illustrated.

**Engineering Achievements.** Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Illustrated record of major Westinghouse activities in 1931.

**Special Alloys.** Federated Metals Corporation, 295 Madison Avenue, New York. Leaflet listing special intermediate alloys, copper base alloys, fluxing alloys, hardeners, aluminum alloys, etc.

**Channeluminum Electrical Conductors.** Aluminum Company of America, Pittsburgh, Pa. An interesting book describing and illustrating the use of "Alcoa" aluminum channel section bus bars.

**Practical Plating Pointers.** The Meaker Company, 1615 South 55th Street, Chicago, Ill. Catalog of mechanical electroplating equipment, including considerable information of interest to electroplaters and finishers.

**Alcoa Aluminum and Its Alloys.** Aluminum Company of America, Pittsburgh, Pa. A reference book giving in concise form data on physical and chemical properties of this producer's alloys. Also, tables showing sizes of basic commodities produced from these alloys, commercial tolerances, etc.

**Japanese Plating Literature.** K. K. A. P. Munning and Company, of Japan, a subsidiary of Hanson-Van Winkle-Munning Company, Matawan, N. J. "A Simple Treatise on Nickel Plating," by J. Macdonald Smith, gives the Japanese plater a concise work on the subject, in Japanese as well as English. The company has also issued catalogs in Japanese.

# Associations and Societies

**REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS**

## American Electroplaters' Society

### Baltimore-Washington Branch

HEADQUARTERS, CARE OF I. H. HAHN, 207 SOUTH SHARP STREET, BALTIMORE, MARYLAND

**Annual Meeting and Stag Dinner**

The Baltimore-Washington Branch, American Electroplaters' Society, held its annual meeting at Sholl's Cafe, 1032 Connecticut Avenue, Washington, D. C., on Saturday, January 30, 1932.

The members and their guests enjoyed a stag dinner before the evening's business was transacted.

**Program of Technical Papers**

The following papers on technical subjects were presented after the dinner:

**The Use of Sodium Silicate in Cleaning Solutions,** by T. K. Cleveland, Philadelphia Quartz Company.

**Difficulties Encountered in Silver Plating,** by F. C. Mesle, Oneida Community, Ltd.

**Experiences in Plating Specimens for Exposure Tests,** by P. W. C. Strausser, Research Associate of the American Electroplaters' Society.

**The Preservation of Egyptian Bronzes,** by F. M. Setzler, U. S. National Museum.

### Chicago Branch

HEADQUARTERS, CARE OF E. G. STENBERG, 2200 NORTH KENNETH AVE. CHICAGO, ILL.

**Annual Banquet and Session**

The Chicago Branch of the American Electroplaters' Society will hold its annual banquet and educational session at the Congress Hotel, Chicago, Ill., Saturday, February 27th, 1932.

The educational session is to start at 1:00 P. M. sharp, in the Florentine Room. The banquet will start at 7:00 P. M., and will take place in the Gold Room.

The following program of papers and addresses will be heard:

**Microscopic Photography of Electric Deposits on Radiator Shells,** by Dr. Oliver P. Watts, Madison University.

**Pitting of Nickel Solutions,** by W. M. Phillips, General Motors Corp.

**Deposition of Chromium on Articles made of Sheet Zinc in the Automotive Industry,** by Charles H. Proctor.

**Standardization,** by C. E. Clindinin, General Spring and Bumper Corporation.

**Investigations in Tungsten Deposition,** by Jos. Rheinhart, Western Clock Company.

**Plating of Stainless Steel,** by Jos. H. Hoefer, Crown Rheostat and Supply Company.

The committee extends a hearty invitation to all platers and their friends to attend. E. G. STENBERG, Secretary.

### New York Branch

HEADQUARTERS CARE OF J. E. STERLING, 2581 46TH STREET, ASTORIA, LONG ISLAND, N. Y.

**Annual Session and Banquet**

The New York Branch, American Electroplaters' Society, will hold its annual educational session and banquet February 20, 1932, at the Aldine Club, 200 Fifth Avenue (corner 23rd Street), New York. The session will begin at 3:30 P.M., Charles H. Proctor presiding. The banquet will begin at 7 P.M.

Platers, chemists and manufacturers interested in electroplating and finishing are urged to attend the session as well as the banquet. There will be a program of technical papers of high educational value, and time will also be devoted to discussion of a variety of plating and finishing topics. Such interchange of information and ideas is a source of considerable benefit to the whole industry.

It is also urged that the members and friends bring the ladies along for the banquet and the dance which will follow.

Early application for reservations are desired, and these should be directed to Mr. Sterling at the address given at head of this notice. NEW YORK BRANCH BANQUET COMMITTEE.

## Institute of Metals Division

HEADQUARTERS, 29 WEST 39TH STREET, NEW YORK

The Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, New York, will hold its sessions in connection with the 141st Meeting of the A. I. M. E., Wednesday and Thursday, February 17 and 18.

The program will begin with a dinner, at the Hotel Commodore, Tuesday evening, February 16. Dr. J. A. Gann, chief metallurgist of The Dow Chemical Co., will be the principal speaker; his subject, "Magnesium." All day Wednesday, excepting luncheon, will be spent in the Auditorium. The program follows:

Some **Aspects of Alloy Building.** By Paul D. Merica. (Annual Institute of Metals Lecture.)

**Copper-beryllium Bronzes.** By J. Kent Smith.

**Machinability of Free-cutting Brass Rod.** By Alan Morris.

**Variations in Microstructure Inherent in the Processes of Manufacturing Extruded and Forged Brass.** By Ogden Bailey Malin.

**Effect of Temperature Upon the Charpy Impact Strength of Die-Casting Alloys.** By B. E. Sandell.

**Effect of Small Percentages of Certain Metals Upon the Compressibility of Lead at an Elevated Temperature.** By Lyall Zickrick.

**Equilibrium Relations in Aluminum-copper-magnesium and Aluminum-copper-magnesium Silicide Alloys of High Purity.** By E. H. Dix, Jr., G. F. Sager and B. Sager.

**Equilibrium Relations in Aluminum-zinc Alloys of High Purities.** By William L. Fink and Kent R. Van Horn.

**Equilibrium Relations in Aluminum-Cobalt Alloys of High Purity.** By William L. Fink and H. P. Freche.

**Surface Effects of Platinum Group Metals on Assay Beads.** By J. L. Byers.

**The Role of the Platinum Metals in Dental Alloys.** By E. M. Wise, Walter S. Crowell and J. T. Eash.

**An X-ray Study of the Nature of Solid Solutions.** By Robert T. Phelps and Wheeler P. Davey.

**Studies Upon the Wildmanstätten Structure. III.—The Aluminum-rich Alloys of Aluminum with Copper, and of Aluminum with Magnesium and Silicon.** By Robert F. Mehl.

**Structure of Cold-drawn Tubing.** By John T. Norton and R. E. Hiller.

**On the Theory of Formation of Segregate Structures in Alloys.** By C. H. Mathewson and D. W. Smith.

**The Influence of the Mosaic Structure of Crystalline Metals on Their Physical Properties.** By Dr. A. Goetz.

#### Gases in Metals Symposium

Among the sessions of the A. I. M. E., there will be a symposium on gases in metals, Tuesday morning, February 16. The program will include the following papers:

**The Solubility of Gases in Metals.** By V. H. Gottschalk and R. S. Dean.

**A Review of Work on Gases in Copper.** By O. W. Ellis.

**The Degassing of Metals.** By F. J. Norton and A. L. Marshall.

**Some Metallurgical Characteristics of Induction Furnaces as Determined by the Absorption of Oxygen by Molten Nickel** By F. R. Hensel and J. A. Scott.

**The Influence of Gases on Metals and the Influence of Melting in Vacuo.** By Wilhelm Rohn.

For complete details, etc., address the Secretary, 29 West 39th Street, New York.

## American Society for Testing Materials

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

#### Standing Committees to Meet

The standing committees of the American Society for Testing Materials will hold their annual Spring Group Committee Meetings in Cleveland, beginning Monday, March 7, and extending through Friday, March 11. In conjunction with these is the third Regional Meeting sponsored by the Society, which will be held on Wednesday, March 9.

The following committees affecting nonferrous metals and finishes have signified their intention of holding meetings in Cleveland, at which the work in the various fields covered by the committee in question will be studied and discussed:

B-1 on Copper Wire.
B-5 on Copper and Copper Alloys, Cast and Wrought.
B-7 on Light Metals and Alloys, Cast and Wrought.
E-4 on Metallography.
Research Committee on Fatigue of Metals.
Research Committee on Effect of Temperature on the Properties of Metals.
Sectional Committee on Zinc Coating of Iron and Steel.

#### New York District Meeting

Another in the series of meetings being held by the members of the American Society for Testing Materials in the New York Metropolitan District is planned for Thursday evening, February 18, when they will gather in a joint meeting with the Iron and Steel Division, Institute of Metals Division, and New York Section of the American Institute of Mining and Metallurgical Engineers.

The annual meeting of the A. I. M. E. will be held February 12-18, so that this joint meeting of its members and the A. S. T. M. will be on the last day of this annual meeting. The auditorum of the Engineering Societies Building, 29 West 39th Street, New York, will be used for this joint meeting.

The general theme of the meeting will be on metals. Dr. F. O. Clements, President, A. S. T. M., and technical director, General Motors Research Laboratories, will discuss the subject "Limits of our Knowledge of the Properties of Metals." Professor H. F. Moore, past-president, A. S. T. M., and research professor of engineering materials, University of Illinois, will address the meeting on "Test Results and Service Values of Metals."

In keeping with the general topic of the evening, there will be a demonstration of ten different tests of welds, by A. B. Kinzel and W. B. Miller, Union Carbide and Carbon Research Laboratories, Inc., and John J. Crowe, Air Reduction Laboratories, Inc.

All who are interested in the subject of this meeting are cordially invited to attend. It is scheduled to begin at 8 P. M.

## N. Y. Section, Electrochemical Society

Professor Bradley Stoughton, chairman of the department of metallurgy, Lehigh University, and president of The Electrochemical Society, will be the speaker of the evening at the joint chemical societies' session on Friday, February 19th. This meeting, in charge of The Electrochemical Society, with American Chemical Society, Society of Chemical Industry and Société de Chimie Industrielle cooperating, will be held in the auditorium of the Electrical Institute of the Electrical Association of New York, Grand Central Palace, Lexington Avenue and 46th Street, at 8:15 o'clock, preceded by supper at the Hotel Shelton, Lexington Avenue and 49th Street, at 7:00 o'clock.

Immediately following the president's paper, there will be an inspection of the electrical and illumination exhibits of the Electrical Institute of the Electrical Association of New York. This tour will afford an opportunity of viewing some of the latest scientific and technical developments of the electrical industry as shown in the exhibits of this Institute.

Supper reservations at $1.25 each with remittance, should be in the hands of The Electrochemical Society's New York Section secretary, William W. Winship, 58 Schenectady Avenue, Brooklyn, N. Y., not later than February 16th. Ladies will be welcomed to both the supper and the meeting.

## American Standards Association

HEADQUARTERS, 29 WEST THIRTY-NINTH STREET, NEW YORK

Bancroft Gherardi, vice-president of the American Telephone and Telegraph Company, has been re-elected president of the American Standards Association for the year 1932. Other officers, who were also re-elected, are: Cloyd M. Chapman, consulting engineer, United Engineers and Constructors, Inc., New York, vice-president, and chairman of the ASA Standards Council; and John C. Parker, Brooklyn Edison Company, Brooklyn, N. Y., vice-chairman of the Standards Council.

## British Institute of Metals

In view of the disturbed economic and financial conditions that prevail in Europe and America, the council of the Institute of Metals has found it necessary to postpone the 1932 American meeting which was to have been held in the United States and Canada next Autumn. The meeting had been planned with the close co-operation—as prospective hosts—of the American Institute of Mining and Metallurgical Engineers.

## British Electroplaters and Depositors

HEADQUARTERS, NORTHAMPTON POLYTECHNIC INSTITUTE, ST. JOHN STREET, LONDON, E. C. 1, ENGLAND

The annual report of the secretary of the Electroplaters' and Depositors' Technical Society of Great Britain contains an interesting review of the past year's activities of that organization.

There was an increase of 42 in the membership during 1931. Attendance at meetings was well sustained. There were nine ordinary meetings, a special meeting in connection with the Faraday Centennial Celebration, and the annual meeting. Discussions of the papers presented were printed and included in the Journal, of which they are a new feature.

The Society's Standards Committee reported considerable progress in its work. A liaison has been effected with the British Engineering Standards Association, and a committee of the latter body was established to study standardization of electroplating chemicals and equipment. A subcommittee is studying nickel salts in order to draft a specification. Definitions submitted by the Standards Committee are under consideration by the B. E. S. A. A member of the Electroplaters has been appointed to take a place on the B. E. S. A. committee studying standards for heavy acid containers. The Society's Standards Committee has drafted recommendations for material for chromium vats and anodes, based on answers to a questionnaire sent to members. Cleaning materials are also being studied with a view to recommendation of most economical and efficient grades. The Standards Committee adopted a constitution giving its function and relationship to the General Committee.

# Personals

### Dr. Horace W. Gillett

Dr. Horace W. Gillett, who has been selected for the W. H. McFadden Medal of the American Foundrymen's Association, which will be awarded at the 1932 convention, is Director of the Battelle Memorial Institute, Columbus, Ohio. He has been especially prominent in research work connected with various branches of metallurgy, much of which pertained to the various cast alloys.

Receiving an A.B. degree in chemistry from Cornell University in 1906, he continued his studies at Cornell and in 1910 was granted the degree of Ph.D. for his work in Physical and Electrochemistry. His varied experience in the industrial and research world began in the summer of 1906, when he served as chemist with Thomas A. Edison, Inc. Then in 1907-1908 he was connected with A. D. Little, Inc., in a similar capacity. During the years 1906 to 1910 he also served as instructor in the Chemical Department of Cornell University. Following this period, he was for two years manager of the Research Department of the Aluminum Castings Company, Detroit. Because of his excellent past work, at this time he was appointed Alloy Chemist and later Chief Alloy Chemist of the U. S. Bureau of Mines, being in charge of the Ithaca field office until 1924, during which time he was working on brass melting, developing the rocking electric furnace, on electric smelting, molybdenum and other alloy steels, and endurance of metals.

In 1924 Dr. Gillett was appointed Chief of the Division of Metallurgy, U. S. Bureau of Standards, supervising the work on physical metallurgy of ferrous and nonferrous alloys. In 1929, when Battelle Memorial Institute, a newly formed endowed research laboratory established to further the application of science to industry, was looking for the best direction of its activities, Dr. Gillett was selected to head this work as Director, a position which he now holds. This institution, which specializes in the fields of metallurgy and fuels, carries out research both upon projects supported by its own endowment funds and upon those sponsored by industry. Several of the projects being studied at Battelle are related directly to the foundry industry, such as high temperature properties of alloy cast irons, foundry refractories, combustion of pulverized fuel, foundry sands, bearing metals, cast steel, cast iron and cast copper-base alloys, etc.

In addition to holding membership in the A. F. A., Dr. Gillett is a member of the A. I. M. E., A. S. S. T., A. S. T. M., American Chemical Society, American Electrochemical Society, British Institute of Metals, and British Iron and Steel Institute. He also is a member of several important committees, such as National Advisory Committee for Aeronautics, Metallurgical Advisory Committee U. S. Bureau of Standards, Advisory Committee Chemical Warfare Service, Alloys of Iron Research Engineering Foundation, A. I. M. E. Research Committee, A. S. T. M. Committees on Non-ferrous Metals, Die Cast Alloys and Fatigue of Metals, the Joint

H. W. GILLETT

Committee on Effect of Temperature on Properties of Metal and the A. F. A. Committees on Cast Iron and Liquid Shrinkage.

Dr. Gillett has been a valuable contributor to many technical publications and has written a book on Molybdenum, Cerium and Related Alloy Steels, as well as contributing chapters on Colloid Behavior to the books on Chemistry in Industry and Non-ferrous Metallurgy. His bulletins and technical papers for the Bureau of Mines cover such subjects as Brass Furnace Practice in the U. S., Electric Brass Furnace Practice, Ferro-Uranium, Electric Smelting of Manganese Ores, Experimental Production of Alloy Steels, etc. His contributions to the Bureau of Standards publications covered such subjects as Light Metals and Alloys, High Silicon Structural Steel, Principles of Heat Treatment of Steels, etc.

In addition to the above, Dr. Gillett has contributed many articles on similar subjects to the general technical press and he is at present editorial director of the magazine, Metals and Alloys.

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**Andrew W. Mellon,** who resigned this month as Secretary of the United States Treasury to accept the post of United States Ambassador to Great Britain, has in former years devoted some of his financial abilities to the aluminum industry. As a young man he became a director of the Aluminum Company of America, the Aluminum Cooking Utensil Company, and the Aluminum Ore Company, besides serving as director of numerous other corporations. When he entered the cabinet under President Harding in 1921, it was necessary for Mr. Mellon to relinquish all corporation offices and directorships.

**William C. Yenger,** 110 East 42d St., New York, announces that his sales agreement with the **Ross-Tacony Crucible Company,** of Philadelphia, Pa., which had been maintained for twenty-two years, has been canceled by mutual consent. Mr. Yenger is Eastern representative of **H. Kramer & Company,** brass ingot makers of Chicago, Ill.

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# Obituaries

### John B. Swift

John B. Swift, former president of the Eagle-Picher Lead Company, died at Cincinnati, Ohio, January 13, 1932. He was eighty-two.

Mr. Swift was a leader in the lead industry for more than 60 years. He was born in Cincinnati on September 21, 1850, the son of Thomas Truxtum Swift and Jeanette Holabird Swift.

When seventeen years old he began work in a hardware house in Cincinnati, and from that beginning became head in 1916 of the Eagle-Picher Lead Company, the largest independent manufacturers of lead in the United States.

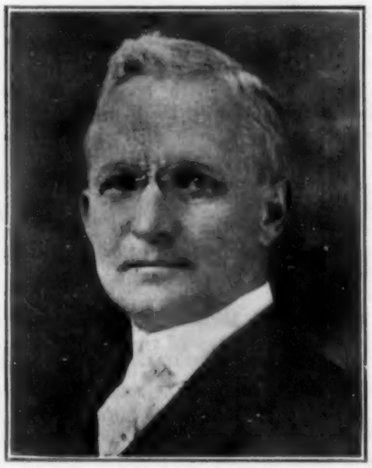
After seven years as an apprentice in the hardware house, Mr. Swift went into the lead business with Eckstein Hills Company as a salesman, remaining until 1880, when the firm's name was changed to the Eckstein White Lead Company, and Mr. Swift was made treasurer. In 1889 this concern was merged in the National Lead Company, and for the next two years Mr. Swift was manager of the Cincinnati branch. In 1916 the name was changed to the Eagle-Picher Lead Company and capitalized at $10,000,000. Under Mr. Swift's management the business grew from $100,000 a year to more than $30,000,000 a year.

Mr. Swift held presidencies in several other Mid-West firms, including the Kruse and Bahlmann Hardware Company, of Cincinnati, and he was a director of a number of other corporations.

### George Edward Abbott

The death was briefly mentioned in these columns last month of George Edward Abbott, president of the Abbott Ball Company, Elmwood and Hartford, Conn.

Mr. Abbott was an important figure in the steel ball business. Born in Gananoque, Ont., Canada, 67 years ago, he spent his



GEORGE E. ABBOTT

early life in Canada. He came to the United States in 1890. In 1896 he became superintendent of the New Departure Manufacturing Company, Bristol, Conn., remaining there until 1908. That year he organized the firm of which he was president at the time of his death. The company manufactures steel balls for bearings, and also burnishing barrels, equipment and materials. In the latter field he was a pioneer.

The metal finishing industry owes Mr. Abbott a great debt of gratitude for his work in ball burnishing. He spent years of effort developing the work, and performed thousands of experiments. In this work he was always completely unselfish, performing great service for the industries in which he was interested, and getting results of a very lasting usefulness. His death has caused great sorrow to all who knew him, to whom he was always a generous host and a wise counsellor, whether they were competitors, customers or simply seekers after technical or business advice.

Mr. Abbott will be suceeded by his son, G. Kenneth Abbott, as head of the company, the latter having been associated in the business with his father.

### Harry C. Welton

Harry C. Welton, a foreman in the Hoffman valve department of the Scovill Manufacturing Company, Waterbury, Conn., died January 16, 1932, after a long illness. Mr. Welton was the son of Hobart L. Welton, and the grandson of Hobart B. Welton, who helped to establish the Waterbury Brass Company.

### William A. Locke

William A. Locke, retired executive of the Revere Copper and Brass Company, died December 27, 1931, at his home at Ridgewood, N. J. He was 68 years old. Mr. Locke was born in Brooklyn, N. Y. About seven years ago he retired from active business as an executive of the Revere company, and made his home at Ridgewood. His death was accidental, resulting from a fractured skull sustained when he fell into a filling station pit after driving his car into place over an adjoining pit.

### Walter S. Marvin

Walter Sykes Marvin, vice-president and general manager of the Metal Ware Corporation, Two Rivers, Wis., died November 22, 1931, aged 44 years.

Walter Sykes Marvin was born at Mauston, Wis., December 16, 1887, the son of Judson L. and Mary Sykes Marvin. He received his early education in the schools of Mauston, and after his graduation from high school there, graduated from the Wisconsin Business University at La Crosse.

Mr. Marvin began his business career in 1908 as a bookkeeper at the Hamilton Manufacturing Company, Two Rivers, where he made rapid advancement. He remained with the Hamilton company until 1911, when he left to take charge of an aluminum plant which had been organized in his home town. In 1913 the aluminum plant at Mauston was sold, and Mr. Marvin accepted an offer from the Burgess Battery Company, at Madison, which remained his home for the next six years.

In 1919 Mr. Marvin became connected with the French Battery Company, Madison, and was sent East to take charge of their branch at Newark, N. J., where he remained until 1923. In that year he was transferred to Chicago to take charge of sales for the French company, a position he held until, in 1926, he became connected with the Metal Ware Corporation as vice-president and general manager.

### Frederick D. MacKay

Frederick De Mund MacKay, a vice-president of E. W. Bliss Company, Brooklyn, N. Y., died recently at his Brooklyn home after a week's illness. He was 66 years old. Mr. MacKay was a graduate of the Brooklyn Polytechnic Institute. Upon graduation he went to work for the Bliss company, becoming sales manager after some years of service. About twenty years ago he became a vice-president.

### John W. Sherwood

John W. Sherwood, president of the Solidarity Watch Case Company, 15 Maiden Lane, New York, died January 24, 1932, at his home near Newburgh, N. Y. He was 69 years old.

### W. Alexander Williamson

W. Alexander Williamson, president of the C. T. Williamson Wire Novelty Company, Newark, N. J., died January 3, 1932. He was 79 years old.

### Joseph White

Joseph White, pioneer foundry operator, died in his eighty-second year recently, at Lima, Ohio.

### C. W. Curtiss

Brief mention was made in the previous issue of the death on January 10, 1932, of C. W. Curtiss, president and general manager of the Waterbury Clock Company, Waterbury, Conn. Mr. Curtiss had been ill only a few days preceding his death. Some two weeks before it, however, he had

C. W. CURTISS

undergone a tonsilectomy, from which friends believe he had not fully recovered when he motored from Orange, N. J., his home, to Waterbury. He was also known to have heart trouble.

Mr. Curtiss had been head of the Waterbury Clock Company only since November, 1931, and a complete biographical notice of him appeared in this journal in December. Born in Southington, Conn., about 50 years ago, he graduated from high school, worked for a time on his father's farm, peddled vegetables in Waterbury, then became associated with John Alvord, head of Torrington Company, for whom he worked in a clerical capacity. He made steady progress, becoming a salesman, branch manager, head of a subsidiary, and at one time head of seven subsidiaries. He left Torrington to become associated with John N. Willys, automobile maker, and was head of one of the Willys plants. Later he organized the Tiffany Manufacturing Company, Newark, N. J., which he sold to Vincent Bendix, and became a Bendix official. A few years ago he retired, but resumed activity when he was made head of the Waterbury Clock Company.

### Edward L. Gowen

Edward L. Gowen, prominent jewelry manufacturer of Attleboro, Mass., died January 8, 1932, at the age of 65. A native of Franklin, Mass., he went to Attleboro as a boy and entered the jewelry manufacturing field there. He rose steadily in that line, and also became a bank director.

### Alan F. Hilton

Alan F. Hilton, 38, metallurgist for the Farrel-Birmingham Company, Ansonia, Conn., died January 23, 1932, after two weeks' illness.

# Industrial and Financial News

### Doehler Die Casting Co.

Doehler Die Casting Company has purchased from the National Lead Company all equipment, inventories and good will of the Newton Die Casting Corporation, New Haven, Conn. Most of the equipment will be moved to the Doehler plant at Pottstown, Pa., but the Newton customers will be served by any one of the five Doehler plants most conveniently located.

This is the second acquisition of a competitor by Doehler within a short time. The previous one was the die-casting division of the Bohn Aluminum and Brass Corporation. By the latest purchase, National Lead becomes a substantial Doehler stockholder, and the lead company will be represented on the Doehler board of directors.

### Magnesium Development Company

The Magnesium Development Company has been formed by the Aluminum Company of America and the I. G. Farbenindustrie A. G. of Germany to develop and utilize magnesium, it was announced yesterday. Walter H. Duisberg will be president. The directors will be named by the companies sponsoring the new unit.

Patent rights pertaining to magnesium products which are owned by the Aluminum Company and I. G. Farbenindustrie will be available to the new company, it was said. Sand and die castings, forgings, sheets, rods, tubing and powder are now available in the form of magnesium and magnesium alloys. Owing to its weight, which is only about one-fourth that of steel and two-thirds that of aluminum, it is believed many new uses for magnesium can be developed.

### New Lead Pipe Standard

Lead Industries Association, 420 Lexington Avenue, New York, has approved a new standard of lead pipe sizes which is being adopted by the principal manufacturers as an aid to consumers. In addition to eliminating numerous variations in pipe sizes now found among lead pipe manufacturers, an outstanding feature of the new standard is that all sizes of lead pipe in the A, AA and AAA classifications, (or "Strong," "Extra Strong" and "Double Extra Strong") will safely withstand constant cold water pressure of 50, 75 and 100 lbs. per square inch, respectively. Heretofore the safe working pressure of these classes of lead pipe has decreased as the diameter of the pipe has increased. The principal changes occur in diameters of 1 in. to 8 in. Alterations made in sizes below 1 in. are of minor importance and small in number, but introduce a uniformity which does not now exist among the lead pipe sizes of various manufacturers. Complete data can be obtained by application to the Lead Industries Association.

### Foundry Accidents

An average of nearly three accidents a day in Ohio non-ferrous foundries during 1931, cost the industry 155 years of lost time, according to Robert Hoierman, secretary of the Ohio Foundries Association at Cleveland, Ohio. This statement is based on the report compiled by the Ohio Industrial Commission which showed 960 non-ferrous accidents resulting in 56,570 lost days. Eight accidents were fatal.

The Ohio Foundries Association is conducting a statewide campaign in an effort to lower the number and the severity of foundry accidents. Reports from more than 200 plants for the months of November and December did not contain a single fatality.

### Copper for House Repairs

A total of probably 3,000,000 homes in the United States require repair and offer a large potential field for the employment-stimulating activities of the President's Committee on Reconditioning, Remodeling and Modernization, according to estimates of the Copper and Brass Research Association, New York. Should the home reconditioning movement gain momentum, potential copper requirements for repair work are estimated by the Association at approximately 270,000,000 pounds, in such forms as copper, brass and bronze roofing, drainage systems, water piping, wiring, hardware, screening, etc.

# News From Metal Industry Correspondents

## New England States

### Waterbury, Connecticut

February 1, 1932.

**Waterbury Clock Company** has made several personnel changes, following the death of **President C. W. Curtiss** of that company, as reported in the obituary section in this number, although some of the changes took place prior to his death. **Clifford H. Hall**, secretary, and **William H. White**, treasurer, resigned. They were succeeded by **George H. Close**, who takes both positions. Mr. Hall was with the company 45 years; he began as a shipping clerk; his retirement was laid to ill health. Mr. White, treasurer only about a month, was elected at the time Mr. Curtiss became president. Prior to that, **Irving H. Chase** had been president and treasurer. **Charles H. Granger**, vice-president and superintendent for many years, is no longer superintendent, continues as vice-president, it has been announced. **Howard Gross**, a former factory employe and also former employe of the old Ingersoll watch factory here, has been made superintendent. He has recently been with the **White Dental Company**, Long Island. New Secretary-Treasurer Close has been cashier. Mr. Chase, former president and treasurer, continues as chairman of the board. No meeting has been held to fill the vacancy caused by the death of **President Curtis**, but the annual meeting will be held this month and action probably will be taken then.

Expenditures of $280,485 by the **Scovill Manufacturing Company** on its Chestnut Hill reservoir dam were not deductable as expenses in figuring taxable income, rules the U. S. Board of Tax Appeals. The company, however, has won a victory in its claim for deducting the amprtization of its war facilities from gross income. The report showed the amortizable costs of buildings, machinery, etc., constructed after the war was declared amounted to $2,372,057. The record showed the company increased its plant facilities $3,082,-353 worth in 1917 and $4,220,753 worth in 1918. Some of these improvements were not regarded by the company as preparation for munitions manufacture. The company claimed its outlay on the dam was an expense, not a capital outlay, due to a leak in the dam.

A large number of rush orders for automatic fasteners has been received by the **Shoe Hardware Company**, and the company has gone on two-shift production. Previously all employes not laid off had been on short time; many had been laid off entirely. The new

orders put back many of the former employes, but did not necessitate new help.

**Beardsley and Wolcott Manufacturing Company,** whose continued existence has been much in doubt during the past year, is now in a much stronger financial position. It has been able to pay off the interest and a substantial amount of the principal on the bank loans, and expects to continue to reduce them at the rate of 20% a year. Interest is being paid on $200,000 of debenture loans. Orders are coming in fairly well; employment is being maintained at a good average. Once during 1931 an attempt was made to merge with a Bridgeport concern then under receivership, but the courts disapproved, and it was feared for a time the local concern would be forced into a receivership. Such fear has now been dissipated by an upturn in business.

**H. R. MacFadden** of the **Arrow, Hart and Hegeman Company,** Hartford, spoke on "Successful Foremen" at the meeting of the Waterbury branch of the American Electroplaters Society last month. He exhibited a group of finished metal products which won first prize at a national exhibition in Washington recently.

Among patents granted local inventors last month were the following: pin package to **George Boden,** assignor to the Scovill Manufacturing Company; thick edge tack fastened button to **Paul E. Fenton** and **G. A. King,** assignors to Scovill; combined filler and anvil for tack fastened buttons to **G. A. King,** assignor to Scovill; duplex thermometer unit to **Alphonso Noble,** assignor to Bristol Company; Scovill was given registration for two trade marks on a container for an inhalant, and a bronze mill metal.

**American Brass Company** reports business is better at all plants, and **President John A. Coe** expects releases for shipments of standing orders, which should continue to improve for some time. A subsidiary here, **French Manufacturing Company,** is also experiencing better business in manufacture of electric refrigeration equipment.

**Scovill** reports business in December was slightly in excess of November and October. **Chase Companies** anticipate improvement in business, with the usual seasonal gains this month. W. R. B.

## Connecticut Notes

February 1, 1932.

**NEW BRITAIN.—**This year **Corbin Lock Company,** division of **American Hardware Company,** will observe its 50th anniversary, and the **Stanley Works** its 80th anniversary; **P. and F. Corbin Company** its 80th anniversary; the **Skinner Chuck Company** its 45th anniversary; **Hart and Cooley** its 30th anniversary. P. and F. Corbin, Corbin Lock, Russell and Erwin, and Corbin Screw comprise American Hardware.

A contract for about $80,000 worth of building hardware for a large Chicago building being constructed by the Marshall Field estate has been received by **P. and F. Corbin.**

**Union Manufacturing Company** has developed an electric powered chuck with great range of jaw pressure. It can be attached to air-operated chucks without discarding the old equipment. Pressure of a button causes the work to be gripped, a reversing button releases it. An operator can work on two or more machines at the same time.

**North and Judd Manufacturing Company** has leased 5,000 sq. ft. in its factory on Elm Street to New Britain Cloak Company.

**Prentice Manufacturing Company** is operating at capacity, largely on "zippers" patented by **George E. Prentice.**

**HARTFORD. — Arrow - Hart and Hegeman Electric Company** has formed a Canadian subsidiary to manufacture electric wiring and switch devices at a plant in Toronto. Production is expected to start this month, with about 40 employes.

**Royal Typewriter Company** directors have deferred dividend discussion until the board meeting in July. Six months ago $1 was declared; before that the annual rate was $3. The preferred stock dividend was paid last month as usual.

**Pratt and Whitney Aircraft Company** has established a gear manufacturing department in East Hartford, with 132 machines and about 75 men. **Victor D. Muzulin** will supervise its operations.

**TORRINGTON.—John A. Coe,** president, **Hendey Machine Company,** denies the company is contemplating going into another line of business, or is to be sold. He said reorganization is pending, and stockholders are being offered a chance to subscribe to 10,000 Class A $25 par shares, and 60,000 Class B 25-cent shares. The company once employed about 1,200, but now has about 100.

**PLAINVILLE.—Trumbull Electric Manufacturing Company** paid a Christmas bonus of one week's pay to all employes whose working time had not averaged at least 41 hours weekly for the past six months. This applied to 227 persons. The company's assessment in the town's grand list for next year will be $945,825, or $85,775 less than last year. **Standard Steel and Bearing Company** is next, with an assessment of $446,535.

**BRIDGEPORT.—**Twenty engineers from Chicago are here planning the transfer of the Hotpoint division of **General Electric Company** to this city, to be completed within a month. It is expected to cause an increase of 3,500 in the local force of the company during the coming year. About 100 employes will come here from Chicago.

**NEW HAVEN.—Winchester Repeating Arms Company,** under new control, has been organized by executives of **Western Cartridge Company.** Officers will be: president, **Franklin W. Olin;** vice-president, **John M. Olin; treasurer, Otto Generich;** assistant treasurers, **Arthur E. Hodgson** and **Edgar W. Taft.** Operations have been resumed with a force of about 2,500.

**Newton Die Casting Company** has been acquired by Doehler Die Casting Company (see page 83).

**NEW LONDON.—Electric Boat Corporation** has started construction of the Navy's new submarine "Cuttlefish," to cost over $3,300,000. A new plant craneway and a mold loft have been set up.

**SOUTHINGTON.—Otto J.** Blank, vice-president, **Peck, Stow and** Wilcox **Company,** has given notice of another wage cut, said to be 10%. The office force, hitherto working eight hours, will go on a seven-hour day.

**TERRYVILLE.—**The brass foundry of the **Eagle Lock Company** has resumed its full time schedule. Previously it was working only three days a week.

**Andrew Terry Company** has given notice of a 10% wage cut.

**MIDDLETOWN.—Russell Manufacturing Company** stockholders met last month and approved an increase in authorized capital from $2,000,000 to $5,000,000. **Daniel R. Weedon,** treasurer, was elected a director, succeeding **Dale D. Butler.** Other officers and directors were reelected. W. R. B.

## Providence, Rhode Island

February 1, 1932.

January saw comparatively little improvement in the local industrial situation, so far as the metal trades are concerned. The jewelry trades, which at this time usually give indications of spring trade, have not yet shown any evidence of increased business.

The textile operations are insignificant. There is thus continued slackness in the small tool industry.

The annual meeting of the **Manufacturing Jewelers' Board of Trade** was held January 15, and the reports submitted by the officers were of interest. **President Edgar M. Docherty** said that "sharp practices, price cutting, loose methods, unfair demands, petty wastes, must be discarded. Credits, accounting methods, sales policies, must be revised and built on a new, sound foundation, if we are to prosper. I appeal to every person in the jewelry industry to lend a hand in improving present credit methods. This is our greatest need today." **Secretary** Horace **M. Peck** reported 1930-1931 business embarrassments, including department stores handling jewelry, as follows:

| Type of Jeweler | 1930 | 1931 |
|---|---|---|
| Retail and Instalment | 583 | 813 |
| Wholesale | 67 | 83 |
| Manufacturing | 69 | 78 |
| Wholesale Watch | 12 | 6 |
| Watch Repair | 19 | 18 |
| Department Stores | 27 | 32 |
| Jewelers' Tools and Materials | 6 | 11 |
| Miscellaneous | 214 | 233 |
| Total | 997 | 1,274 |

**Pawtucket Smelting and Refining Works,** Providence, has filed notice of a change in capital stock from $250,000 and 15,000 shares of common no par value, to $10,000 and 1,000 shares of common no par value stock.

**George Hamilton Company,** manufac-

turers of jewelers' tools, has removed from 144 Pine Street to 70 Ship Street, Providence.

The regular monthly meeting of the **Metal Finding Manufacturers' Association** was held as a luncheon-session at the Narragansett Hotel, Providence, Jan. 6, with 19 members present. **Ralph Gregory,** president of the association, conducted the business session. **William M. Simmonds,** retired manager of the **Josiah Walsham Company,** former members of the association, was elected an associate member in honor of his interest and participation in association matters since its organization. After luncheon **Herbert Barlow,** patent attorney of Providence, addressed the gathering.

**J. Salinger, Inc.,** has been incorporated to manufacture jewelry at Providence; capital stock, $2,100 in 21 shares of $100 each and 200 shares of common of no par stock. Incorporators: Arthur H. Feiner, M. E. Stayner and Robert Brown, all of Providence.

The 1932 banquet of the **New England Manufacturing Jewelers' and Silversmiths' Association** will be held at the Providence-Biltmore Hotel, Saturday evening, Feb. 27, at 6:30 o'clock. There will be a reception from 6 to 6:30. The speaker of the evening will be **Billy B. Van,** president of **Pine Tree Products Company, Inc.,** Newport, N. H. Banquet committee: Joseph H. Lancor, chairman; Gottlob Armbrust, Edwin H. Cummings, Jr., William G. Lind, Paul B. Paris, Sturgis C. Rice, Joseph F. Rioux, Leon Silverman, Hayward Sweet, H. Benjamin Whitaker. W. H. M.

### Springfield, Mass.

FEBRUARY 1, 1932.

While last month saw employment figures in 26 metal working concerns in this district drop to 12,267 as against 13,066 employed in November, a general improvement in trade conditions in this area throughout January boosted the number of metal workers to 13,054 and indications are that during next month and March the figure will climb even higher.

Since the acquisition of the Bentley motors by **Rolls-Royce, Ltd.,** of England, and the subsequent sales of the Bentley sport models at a great reduction in prices, it is generally felt in local circles that both the English and the American Rolls-Royce concerns will enter the sport car field. Already orders for new machines are increasing at the local Rolls-Royce plant and it is believed that should the company definitely decide to enter the sport car field, work at the plant would be greatly increased.

Due to great demands from the **Ford Motor Company** for magnetos, ignition systems and horns, work at the **United American Bosch** plant has been decidedly on the upward trend throughout the entire month, and promises to continue at the same or possibly a slightly higher level through at least the next 2½ months, according to word from the plant officials.

Foundries and pattern shops throughout the city and nearby communities report that their sales during the past month have been greatly increased, and firm leaders are convinced that business in this area is decidedly on the up grade.

**Westfield Manufacturing Company,** bicycle manufacturer, reports that although there has been a slight falling off in the demand for spring fulfillments, the decrease is only slightly more than slumps noted in orders for spring deliveries during past years.

A rush of orders for multiple spindle drills for the automotive industry from the **Bausch Machine and Tool Company** has placed that firm in as strong a position as any local metal working concern at the present time.

At the **Cheney Bigelow Wire Works,** the development of a new foudrinier wire for paper mill use has placed many news firms on the company's order list. Many firms, however, report that conditions in their factories are such that the new type of wire cannot be used. However, in view of the fact that orders from the old customers for their usual types of wire, and new accounts from the concerns which are able to use the new product, business at this plant is booming and seems destined to reach a high point with the successful use of the new wire.

Plans for great expansion are under way at the local plant of the **Westinghouse Electric and Manufacturing Company,** with the production schedule calling for about 650 refrigeration units daily. That figure has practically been reached. By the first of March the firm also hopes for a daily output of 120 electric ironers daily. Other branches of the firm are comparatively quiet.

Samples of a new machine to be constructed by the **Indian Motorcycle Company** have been made and production of the new 300 pound two-cylinder type is expected to get under way shortly. With production of this machine Indian officials believe that their sales will be greatly increased and are confident that business will show a decided upward trend throughout the spring months. G. B. Y.

## Middle Atlantic States

### Central New York

FEBRUARY 1, 1932.

**Howard D. Wolfe,** general manager of the **Revere Copper and Brass Corporation,** heads the Chamber of Commerce in Rome, N. Y., and the city feels it has a capable executive to reach out for new business. Mr. Wolfe was this month elected president to take the place of **Arthur S. Evans.**

Patent on a process for the recovery of indium, zinc and precious metals has been granted to **William S. Murray** of Utica. U. S. Patent Office allowed four claims of new and patentable features. Mr. Murray is prominent in research work at **Oneida Community, Ltd.,** to whom he assigned the rights to his process.

**Charles Millar,** Utica, has been re-elected president of **Charles Millar and Son,** wholesalers in non-ferrous pipe.

**A. D. Ross Fraser,** Rome, chief statistician, **General Cable Corporation,** addressed the Utica Chapter, National Association of Cost Accountants, at their January meeting, on "Statistical Reports as a Basis of Sales Production and Financial Control."

**W. A. Tobler,** former president of **Winchester Arms Company,** has been elected vice-president of the **Remington Arms Company.**

**R. D. Jackson,** who was controller of Winchester, has been named controller of Remington. Both have headquarters in Bridgeport, Conn.

**International Heater Company** is looking forward to steady operation in 1932. **Irving L. Jones,** president, believes there will be no cessation of activities at the Utica plant in 1932. The name of International is known from the South Sea Islands, where its products are used for drying copra, to Newfoundland, where the apparatus is used to heat Dr. Grenfell's world famous hospital.

**Interstate Commerce Commission** dismissed a complaint brought by the **Rome Company, Inc.,** of Rome that freight rates on certain articles of metal furniture in carloads from its Rome, Chicago and Baltimore plants to destinations in the South were and are unreasonable and unduly prejudicial.

A verdict of accidental death is expected from Coroner O. H. Love, Little Falls, at the inquest scheduled over the body of **Daniel F. McGuire,** 32, fatally injured by a bullet fired from a gun being tested in the old shooting gallery on the top floor of the Remington Cash Register building in Ilion. **Clarence Barrett,** who was helping McGuire move machinery, was struck by the same bullet, receiving minor injuries. McGuire had been head of the receiving department of the **Remington Cash Register Company** for two years, and after the sale of the company continued in the employ of the Arms company.

**Rome Brass and Copper** basketball team, member of the Rome Civic League, nosed out the Rome School for the Deaf, 35 to 33.

**Herbert S. Powell,** automobile muffler inventor and manufacturer, and **Ambrose J. McNamara,** inventor, both of Utica, who have fought court battles for years, resumed litigation in January when Mr. Powell filed suit in Federal district court to determine the patent right to an improved muffler.

The new Powell car heater is being well received by the general public. It takes pure air from in front of the car, forces it through pipes to a leak-proof steel cylinder mounted inside a muffler, then through pipes to registers in front and rear seat compartments.—E. K. B.

### Newark, New Jersey

February 1, 1932.

**Hanson-Van Winkle Company** has sold its Newark plant to the **Superior Air Products Company.** The concern leased a portion of the plant some years ago and recently decided to buy the factory. The building is a unit of the series of buildings once occupied by the Hanson-Van Winkle Company, prior to their consolidation in the Hanson-Van Winkle-Munning Company and removal to Matawan, N. J.

**Vice Chancellor Church** has appointed **Sidney Lasser** receiver for the **Central Radio Corporation,** Washington Street, Newark. Consent to the receivership was given by the defendant concern.

**Industrial Welded Alloys, Inc.,** has leased to the **Welin Davit and Boat Corporation** a large portion of the industrial plant at Newark. The premises taken over by the Long Island City concern include the foundry and foundry office building, together with 20,000 square feet of open yard space fronting on the Passaic River.

**Welding and Machine Company Works,** Jersey City, will erect a two-story factory to cost $40,000.

**Federal Judge Fake** has ordered **Paul E. Heller** to show cause why he should not be removed as a co-receiver of the **National Harris Wire Corporation.** The petition for the order was made by the other receiver, **William. G. Fox.** It is alleged that Heller is unfair in his position in that he hired an official at $7,500 a year when he was not needed.

**Farr Electric Company, Inc.,** 28 Treat Place, has purchased a property on Austin Street. The Parr company specializes in industrial electrical material and has offices throughout the United States and in foreign countries.

**Standard Casement Company,** Newark, has been incorporated with $100,000 capital to manufacture metal casements.

**American Conduit Company** has begun business with 2,500 shares to manufacture metal conduits. C. A. L.

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### Trenton, New Jersey

February 1, 1932.

Trenton metal plants report a little improvement since the new year began, and manufacturers are hopeful that business will pick up. **Edgely Brass Company,** Edgely, Pa., says there has been no change in business for the past several months. The smaller brass concerns in Trenton appear to be holding their own.

Instantaneous conversion of rocks of silica or magnesia base to the vapor of their constituents has been reported by **Frank T. Chesnut,** electrical engineer of the **Ajax Electrothermic Corporation** here. Mr. Chesnut has developed a method by which heat may be maintained at 3,600° Centigrade, almost 1,000° higher than the present commercial limit of controlled heat. On one occasion the furnace was wrecked by gas when the power was kept on too long. Experiments were conducted under the direction of **Dr. Edwin Fitch Northrup,** of Princeton, a vice-president of the corporation.

**John A. Roebling's Sons Company** has been granted a tax refund of $11,095.69 by the Treasury Department at Washington. **Hyatt Roller Bearing Company,** Harrison, N. J., received $144,379.

**William S. Calcott,** Pennsgrove, N. J., and **Alfred E. Parmalee,** Carney's Point, N. J., have been granted a U. S. patent for a composition for stabilization of terra alkyl lead, assigned to **E. I. duPont de Nemours Company,** of Wilmington, Del. The same two inventors were allowed another patent on another composition of a similar kind.

**Allan H. Jones,** Trenton, was awarded a patent on a process of securing bearings in place by reason of friction contraction. He has assigned his invention to the **Roller Bearing Company of America,** Trenton, N. J.

**Charles-Davis, Inc.,** Atlantic City, has been chartered with 500 shares common to manufacture jewelry and metals. **Dawn Laboratories,** Atlantic City, has been incorporated with $100,000 capital to manufacture chemicals. C. A. L.

# Middle Western States

### Detroit, Mich.

February 1, 1932.

Production in all the non-ferrous metal plants has shown some improvement during the last 30 days. This is due largely to increased motor car and refrigerator manufacture. The automobile is face to face with its spring campaign. Refrigeration is speeding up due to increasing favor of this type of home convenience.

All eyes in the middle west are now centered on the motor field, for this is a business barometer and much depends on what happens during the next month or so. The New York and Detroit shows have stimulated hope in this field. Extensive buying was reported at both these exhibitions.

Accessory manufacturers are active throughout this area, but continuance depends altogether on the vigor with which the public absorbs the new car models.

The plating industry also is showing moderate improvement. Its duration, however, likewise depends on what develops in the motor field.

Manufacturers of plumbing and steam fitting supplies are showing little activity. Jewelry manufacture is extremely quiet, and not much is expected until economic conditions change for the better.

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**Independent Stove Company** at Owasso, Mich., whose plant has been closed for two months or more, has resumed operations.

The main office of the **American Enameled Products Company,** now located in Chicago, may be combined with the Mt. Pleasant, Mich., factory, it is announced. A program to take on additional lines of metal specialties also has been considered, it is said.

**Norge Corporation,** division of **Borg-Warner Corporation,** manufacturer of "Rollator" refrigeration, announces completion of enlarged manufacturing facilities both within the recently acquired **Alaska Refrigerator Corporation** plant at Muskegon Heights, and at the Rollator plant at Detroit. With orders far in access of a year ago, Norge plants shortly will be operating on full time basis, according to **Howard E. Blood,** president.

Observers of highway transportation believe a new era of lightened construction in coaches for passenger car service, and eventually of all types of automobiles and commercial cars, has been started by the **General Motors Truck Corporation,** with factories at Pontiac, Mich. This company developed two coach models of 40 and 44-passenger capacity, respectively. The use of newly developed heat-treated aluminum alloys in these vehicles permits reduction of approximately two tons in weight of each. Other advanced features are open-type aluminum alloy wheel hubs, replacing the conventional wheel entirely and giving added safety by increasing brake surface; heat-treated aluminum alloy under-framing with which the chassis frame is integral, provides for adequate support of the bodies; side posts of heat-treated, drop-forged aluminum; heat-treated aluminum alloy side panels; body cross-sills of pressed aluminum alloy, with all exposed parts of heat-treated aluminum, preventing rust, paint peeling or corrosion; window sashes of drawn brass, metal parts of doors of heat-treated aluminum alloys, and aluminum pedestals. In fact, aluminum prevails throughout the entire coach.

**Leonard Electric Refrigerator** division of the **Leonard Kelvinator Corporation** reports shipments of late to be 24% greater than a year ago. Sales are well in excess of quota, and orders on hand for shipment undoubtedly will make still greater gains, it is said. Kelvinator officials believe that the electric refrigeration business will continue the upward curve and achieve a new record during the current year.

January orders for **Mueller Brass Company,** at Port Huron, Mich., are 25% above January, 1931, according to **Robert W. Peden,** treasurer. This company produces automobile forgings, bushings and fittings.

A new product, the Sparton electric refrigerator, has recently been placed on the market by the **Sparton-Withington Company,** Jackson, Mich. This is a part of the company's extension program to include practically every type of home electrical appliance. The new refrigerator line includes three sizes

F. J. H.

### Cleveland, Ohio

FEBRUARY 1, 1932.

Many encouraging factors are visible in this area that give heart to manufacturing, particularly in the non-ferrous metals field. But it would be unwise to expect a sudden or widespread improvement such as prevailed, for instance, two years or more ago. It is only necessary to cite such elements as the railroad situation and unemployment to bring home the realization that business in general during the present year will be an up-hill battle.

A new note of confidence has been injected by the assurance of the speedy establishment of the Reconstruction Finance Corporation, according to the Union Trust Company, of this city. This institution believes that hopes for practical benefits from the workings of the corporation are justified.

The recent automobile shows already are reflecting a betterment in this field, and indications now are that January production will show gratifying increases. Business continues to mark time, waiting further developments.

Large orders from Detroit have made full-time operating schedules possible for automobile parts manufacturers here. Among the outstanding are the **Chase Brass and Copper Company** and the **Cleveland Hardware Company.**

Hupmobile has concentrated in Cleveland plants the building of all bodies for its new 1932 models. Prior to construction of the new cars, Hupmobile purchased most of its bodies, using its Cleveland plants for production of the former "Century 6" models. Beginning with the new 1932 series, however, Hupmobile moved its six-cylinder production back to Detroit, where all of the eight-cylinder cars are also manufactured. The company is now able to devote the Cleveland plants exclusively to body production. F. J. H.

### Wisconsin Notes

FEBRUARY 1, 1932.

**DeWitt F. Riess,** 45, vice-president of the **Vollrath Company,** Sheboygan, manufacturers of enameled kitchen ware, died suddenly on January 8 while attending a sales convention in Chicago. Upon the death of his father in 1906, he became associated with the Vollrath company, of which his father had been secretary and treasurer. Mr. Riess was active in the civic and social life of Sheboygan. He is survived by his mother and sister.

**Industrial Metals Corporation** has been incorporated, to manufacture zinc, lead, gold, silver, copper, etc., by Leo D. Swidler, Harry Primakow and Charles Swidler.

A banquet in honor of **Frank J. Frey,** vice-president and treasurer of the **Geuder, Paeschke and Frey Company,** Milwaukee, was tendered Jan. 5 at the Wisconsin Club. Mr. Frey is celebrating his fiftieth year as an official of the Milwaukee concern, which manufactures enameled and galvanized ware.—A. P. N.

## Pacific Coast

### Los Angeles, Calif.

FEBRUARY 1, 1932.

The brass and bronze lines have been very quiet during the past year, and are not showing much improvement. The aluminum lines have been in better condition, due to the large amount that has been used of late years in various parts of buildings, yachts, motorboats and the refrigerated trucks.

There has been considerable talk here of building a large smelter for tin, which could be brought in large quantities from Bolivia. The tin ore is now shipped to England, where it is smelted and shipped back here.

**Holmes Manufacturing Company,** 645 South Johnston Street, has started manufacturing brass and other metal beds, in round, molded and square tubing, in all finishes.

**Charles H. Pearson,** after a three year trip around the world, has now been stationed at 135 Fremont Street, San Francisco, as western sales manager for the **Yale and Towne Company,** for their materials handling division.

**Angelus Sanitary Can Company** at 4900 Pacific Boulevard, will spend $35,000 in making enlargements to the plant.

**Jackson-Bell Company,** making radio sets, has moved to a new factory at 6500 McKinley Avenue, where they have 40,000 square feet of space.

The maintenance department of the **Southern California Freight Lines** will make a new style of milk carrying tanker, like the oil tankers. It will be built on the principle of the thermos bottle. There will be one cylinder inside of another, the space between being vacuated. The cylinders will be made of aluminum and will have a capacity of 1,000 gallons of milk, the tank would be 80 inches in diameter. Brass and bronze would also be used for various outside fittings.

**Pacific Copper and Brass Company** says that everything is slow in those lines.

**Fletcher-Weil Company** are giving up the "Republic" line of plumbing parts of brass and bronze, and that line is being taken over by the **Grabler Manufacturing Company,** 1921 East 7th Street.

**George Wheeler,** of this city, states he is the inventor of a system of putting a steel facing on copper or brass that cannot be filed or chipped off; also, a method of welding copper to high speed steel; also, an aluminum welding process. Mr. Wheeler, Charles H. Smith and Percy Langley have organized the **Uhelite Company** at 1737 East 7th Street, to further these processes, and will get in touch with eastern manufacturers. He says we have never been able to use copper and steel, brass and bronze in salt water to advantage, owing to the electrolysis and disintegration. He has a process which does away with all that trouble. He took a piece of steel, which had an ordinary tensile strength of 60,000 pounds, hardened it, increasing the strength to 185,000 pounds. The California Institute of Technology at Pasadena is interested in the ideas he has.

**Kittle Manufacturing Company** of 648 Santa Fe Avenue, has a contract to make 131,711 pairs of copper auto license plates for the State of Arizona. They will use 75,000 pounds of copper, making these plates for 14½ cents per unit.

**Hoffman Specialty Company,** Architects' Building, has started to manufacture "Thermador" fan electric heaters, of brass and bronze. **Harry H. Daley** is the general manager.

**Aluminum Association of America** and the **Copper and Brass Research Association** have very comprehensive exhibits at the Architects' Building.

**Pacific Coast Sign Company** has started to manufacture neon signs at 336 West Pico Street.

**Hartmann Manufacturing Company** is making a new washing machine at 1460 Havenscourt, Oakland. **A. H. Hartmann** is the proprietor.

**Art Metal Construction Company,** Jamestown, N. Y., has moved its western headquarters to 942 South Hope Street. H. S.

## Other Countries

### Birmingham, England

JANUARY 18, 1932.

In view of the disturbed economic and financial conditions that prevail in Europe and America, the council of the Institute of Metals has found it necessary to postpone the 1932 American meeting which was to have been held in the United States and Canada next autumn.

The non-ferrous metal market has not opened the year with any increase of stability. Business remains quiet in Birmingham. Prices of rolled and drawn brass and copper products remain at the same level as before the year-end holiday. Notwithstanding the break in the exchange between this country and the United States, standard copper is more than £6 below the price ruling a year ago. Tin is £18 to £20 higher. Lead, too, reflects the advance, though not very noticeably, and spelter costs about £1 more.

Throughout 1931 branches of manufacture whose raw materials were non-ferrous metals were aggravated by the continued instability of prices. Probably the only trade in which consistent progress was made is that of aluminum hollow ware. There was also an increasing use of aluminum castings in the motor trade. Output in the brass trade has been lower, owing to the poor support received from the engineering industries. The market for gas and water fittings has suffered from the check to building activity. There has been only a meagre demand for brass cabinet hardware and for hardware which enters into house furnishing. Notwithstanding the advance of electrification, the market has been more than sufficiently supplied with electric fittings and products which enter into the technical side of the industry.

Fluctuations in raw material costs have been so frequent that industrial consumers have been forced to keep a very tight hand on stocks.

The order obtained under the Merchandise Marks Act a few years ago requiring that imported water fittings should bear an indication of origin has proved helpful to British manufacturers. Since the breakdown of the exchange the English market has not been subject to the invasion of inferior Continental products as it formerly was. Inquiries have been received from distributors at home and abroad who want to find sources of supply in the United Kingdom to replace foreign goods which by the fluctuation of the pound have become relatively dearer. But the tendency in partly industrialized countries to supply their own needs, along with the decreased purchasing power in all the markets, has entailed a heavy shrinkage in the export trade in rolled brass tubes, wire and general manufactured products.

In the first few days of 1932 there has been a marked improvement in some sections of Birmingham industry, particularly with those firms making radio products. In the non-ferrous metal mills, however, buying is mainly concerned with small quantities as it is still uncertain whether stability in the copper market will be reached in the near future.—J. A. H.

# Business Items—Verified

**Union Metal Works,** Chelsea, Mass., recently completed an addition to the foundry, and purchased some new equipment, due to increased volume of business.

**James F. DeQuoy Company, Inc.,** New York, has been organized by James F. DeQuoy, 242 East 37th Street, electrical contractor, and associates, to manufacture electric lighting fixtures and equipment.

**Iroquois Foundry Company,** Racine, Wis., manufacturer of gray iron castings, is installing brass and aluminum casting equipment. The new department will be managed by **F. W. Busche,** formerly with Prime Manufacturing Company of Milwaukee. The firm will operate the following departments: brass, bronze, aluminum and gray iron foundry.

**Waterbury Clock Company,** Waterbury, Conn., is increasing production of electric clocks and mechanisms, with orders for over 150,000 clock units on hand. Tool makers are working overtime and other departments are advancing schedules.

**National Electric Products Corporation,** Fulton Building, Pittsburgh, Pa., manufacturer of electrical conduits and fittings, wires and cables, etc., has leased 20,000 sq. ft. in building at Philadelphia for factory branch, storage and distributing plant. The Philadelphia offices are at N. W. corner 31st and Oxford Streets.

**Scanlan-Morris Company,** Madison, Wis., manufacturer of hospital and laboratory equipment, has acquired the business of **Operay Laboratories,** Chicago, and will manufacture the "Operay Light" in its plant in Madison.

**A. Gilbert and Sons Brass Foundry,** 4015 Forest Park Boulevard, St. Louis, Mo., recently filed voluntary petition in bankruptcy. The company has been in business in St. Louis for over thirty years, and expects to start over, under the name **Gilbert Brass Foundry Company,** 4451 Manchester Avenue, St. Louis.

**Charles F. Kenworthy, Inc.,** Waterbury, Conn., builders of industrial furnaces, announces the appointment of **W. H. A. Robertson and Company, Ltd.,** Lynton Works, Bedford, England, as their sales representatives in Great Britain and Continental Europe, succeeding their former representatives, Messrs. Larmuth Brothers in England, and Ernst. Rosenberg and Company in Berlin.

**American Kron Scale Company,** manufacturers of all types of heavy duty automatic dial scales, has been re-organized under the name of **The Kron Company,** to provide additional capital for broadening the lines and increasing the activities of the company. The plant has been moved from its old location in New York City to 1720 Fairfield Avenue, Bridgeport, Conn., where larger and more adaptable space is available.

**Valley Castings and Pattern Company,** Bay City, Mich., reports that it has developed a method for manufacturing pure copper castings containing copper tubing inserts. The castings are for use in welding machines and transformer secondary castings which must be water cooled. The firm claims that the use of copper tubing inserts does not affect the conductivity of the castings as does the use of steel tubing. The following departments are operated: brass, bronze and aluminum foundry.

**Joslyn Company,** 9th Street and Chesapeake Avenue, Baltimore, Md., has razed all buildings and is erecting buildings 50 by 165 feet and 203 by 165 feet, brick, concrete and steel, for manufacturing and material storage, respectively. Company manufactures pole line equipment. Company also contemplates erection next year of a duplicate of the storage building.

**The E. Ingraham Company,** Bristol, Conn., is producing a new line of synchronous motor clocks which are covered by a number of patents. Company is making most of the parts itself, but motors are being assembled elsewhere. Silent operation, continuous lubrication by means of a reduction train operating in a sealed die cast box and other features are embodied. Clocks sell at popular prices and are being well received.

**Chromium Plating Company,** Tulsa, Okla., recently organized, has established in a plant at 123 North Cincinnati Avenue, and is doing a line of general chromium and other plating, as well as specializing in chromium plating of oil field equipment. **C. R. Pritchard,** in active charge, states plant is completely equipped with all types of solutions, polishing facilities, laboratory, etc. **W. H. Helmich** is president.

**Newman Manufacturing Company,** Cincinnati, Ohio, has received a contract for $30,000 worth of architectural bronze work for a new post office at Waterbury, Conn. Efforts of Waterbury manufacturers to have brass used, in view of the city's being the center of the brass industry, were ineffective, the government sustaining the architects, who recommended bronze.

**Viking Metal Products Corporation,** Ridgway, Pa., manufacturers of metal doors, trim, elevator fronts, etc., now in receivership, has not suspended operations, and the plant has considerable business booked, according to **Dan S. Dickinson,** receiver.

**E. Reed Burns Manufacturing Corporation,** makers of polishing compositions and buffing wheels, with plant and office at 21 to 27 Jackson Street, Brooklyn, N. Y., announce that **P. H. Holton,** 5340 Large Street, Philadelphia, Pa., became associated with them on January 1 as representative in the Philadelphia district. Mr. Holton's wide and practical experience in industry makes him particularly well suited to be of service to companies doing polishing and buffing.

**R. Fuess, Inc.,** German manufacturer of instruments for scientific and industrial research and control, has established an American office at 245 West 55th Street, New York. Among the company's products are precision instru-

## Corporation Reports

**Mueller Brass Company**—Year ended Nov. 28: Net loss after depreciation, interest and other charges, $402,830, compared with net loss of $572,848 in preceding fiscal year.

**Ohio Brass Company**—Year ended Dec. 31: Net loss after taxes and depreciation, $113,773, against net profit of $1,817,518 in 1930.

ments for microscopy, flow and pressure, temperature and process control. Lewis **Muscat** has charge of the American office.

**Hudson Smelting and Refining Company**, Newark, N. J., has acquired the interest of **I. W. Wilenchik** in the **Industrial Metal Company**, Newark. The Hudson company has been majority stockholder for some time. Mr. Wilenchik has resigned and is succeeded as president by **J. W. Paterson.** Both firms are located at 85 Hyatt Avenue.

**Horton-Angell Company,** Attleboro, Mass., jewelry manufacturers, was robbed of $60,000 worth of gold wire, rolled gold plate and bullion on January 31. They entered the plant about midnight, bound the watchman, and took only genuine precious metals, testing the stock with acid before taking it.

# Metal Market Review

By R. J. HOUSTON
D. Houston and Company, Metal Brokers, New York

### Copper

FEBRUARY 1, 1932.

Although the copper market did not display any significant activity in January there is every reason to believe the curtailment program now in operation will prove effective in bringing back normal conditions eventually. Recent negotiations and agreements between world producers showed a determination to solve the problems confronting the industry in a way that will ultimately reduce surplus stocks and establish confidence in all branches of the trade.

The proposals recently agreed upon reveal broad and sound policies that must be regarded as a long step forward toward brighter times for copper. A rigid adherence to a world output of about 26½ per cent of estimated capacity will undoubtedly prove a development of outstanding remedial value. This voluntary curtailment plan, as a basis of mine operations went into effect Jan. 1, 1932. More than 90 per cent of the world's production is included in these restriction measures, of which approximately 70 per cent is from mines situated outside the territorial limits of the United States.

Prices moved in a narrow range in January, with trading extremely light. First hand copper quoted 7¼ to 7½ cents, and an occasional lot of "outside" copper was reported for sale at concessions. European demand was also slow, but the export price remained unchanged at 7⅝ cents c.i.f. usual foreign ports.

### Zinc

A downward trend developed in the market for zinc lately which forced the price of Prime Western down to 2.90 cents East St. Louis, thus matching the all-time low level reported in 1895. Surplus stocks of ore also rose to 86,000 tons, a record high total, and emphasized the weakness of the ore position compared with conditions at the beginning of the year when stocks of ore were over 5,000 tons less than at present. The January opening was on the basis of 3.12½ cents East St. Louis, and 3.47½ cents New York for Prime Western slab zinc. In the second half of the month the market gradually lost ground, although an easier tone developed before that on dull demand and freer offerings.

### Tin

Buying of tin for consumer account in January was on a restricted scale. Local speculative interest was also at a low ebb, and the total turnover on the National Metal Exchange from Jan. 1 to Jan. 26 inclusive was reported at only 285 tons of Standard tin. Transactions on the London Metal Exchange, however, for the same period amounted to 14,165 tons. The New York price of prompt Straits tin between the dates above mentioned fluctuated between 20.70 and 22.37½ cents. In the London market the range of prices during the corresponding period was between £139 12s 6d and £145 7s 6d per ton.

### Lead

Transactions in lead during January were in large volume especially in the first half of the month. All the major branches of the consuming trade participated in purchases covering nearly and in some cases February requirements. A steady market trend characterized the situation right through the month. Prices of 3.75 cents New York and 3.55 cents East St. Louis are obviously conducive to large scale consumption. Consumers can be consistently conservative at the present price levels which are about one cent a pound below what they were a year ago. Demand during the second half of January was alternately dull and fairly active.

### Aluminum

Demand for aluminum is taking up a fair tonnage of shipments, but deliveries are less than in normal times. Prices of primary metal, however, are steadily maintained, and this is one commodity produced and sold for satisfactory profits. Selling pressure and price recessions are unknown factors in aluminum. This extraordinary condition suggests study and emulation. Aluminum spandrels are to be a feature in the Rockefeller group of buildings in New York. It is said that 3,000,000 pounds of aluminum will be required to fill this order.

Diversified use of aluminum is steadily increasing, and research experts are actively engaged in developing new outlets for this metal. Like copper it is becoming more and more specified in modern architectural construction. The latest design of motor trucks call for all-aluminum bodies. Aluminum hopper-bottom freight cars are being built almost entirely of aluminum which weigh 21,200 pounds less than the usual type. Aluminum chairs are also coming into fashion and are specially adapted for hotel and restaurant purposes. It is a matter of interesting observation that the copper and aluminum producers are bringing to public attention the superior properties and advantages of their several products and alloys.

### Antimony

Conditions in antimony lately reflected dullness of demand. Price of Chinese regulus at end of month was 5.95 cents duty paid and represent a decline of about 20 points since the beginning of the year. There were also rumors of a slight concession recently from the above quotation. Later indications, however, revealed a higher market tendency on China shipments owing to the seriousness of the situation at Shanghai. Shipments from the Orient may be suspended owing to developments in that part of the world. Consumers may possibly have to look elsewhere for supplies until normal trade with the Far East is renewed. Stocks here are low, and under certain circumstances the market here could readily develop a firmer tendency.

In the local market copper was offered at 7 cents. The price on limited supplies for export was quoted at 7⅛ cents, and the lower price resulted in fairly good bookings for European delivery at usual ports.

### Quicksilver

The market for quicksilver maintained a fairly steady tone, although demand was quiet on the basis of $64 to $65 per flask of 76 pounds. Inquiry was mostly for small lots, but at end of month there were reports of a slightly firmer tendency.

### Platinum

Prices of refined platinum remained practically unchanged at $37.50 to $40 per ounce, with minimum quotations on special cash transactions. No important developments were reported recently.

### Silver

Fluctuations in silver bullion prices were narrow lately. This is not surprising, however, as market values of silver have already suffered such drastic depreciation it is obvious the downward movement will eventually be corrected. There is a widespread movement on foot to get the leading nations of the world to co-operate on some plan that will solve the present problem over the silver question and devise some plan whereby gold and silver will function in accordance with international needs. The dislocation and disparity that exists between these two monetary standards has something to do with the present world depression. The unsettled conditions in the Orient caused a falling off lately in demand from China and India. United States production of silver in 1931 is estimated at 31,737,000 ounces as compared with 50,234,000 ounces in 1930. Closing price in January was 29¾ cents as against 30⅛ cents at beginning of month.

### Old Metals

Developments in the scrap metal situation followed to a considerable extent the trend in the market for the unwrought material. Exporters and domestic buyers operated on a restricted scale. Prices on all grades of secondary copper are low, and the same is true on all metals. Under present conditions many of the quotations are nominal as holders are not inclined to make concessions for the home trade or shipment abroad. Lead and zinc grades are easy, and moving in moderate tonnages.

# The Wrought Metal Business

By J. J. WHITEHEAD

President of the Whitehead Metal Products Company of New York, Inc.

February 1, 1932.

With the turn up to 7¼c. for copper a better sentiment pervaded the industry. There was also a feeling that at last a balance between consumption and production had actually been reached. It is believed now that if consumption keeps going at about the same rate as during January, perhaps the price structure will tend to strengthen. It would not be surprising, though, if there was a slight reaction from this level, and that after this took place the seasonal spring pick up might come along.

It is believed that by April 1 or May 1 the business situation will look a great deal better. As pointed out in these articles during the past several months, the prices of commodities are not slipping off but seem to be bouncing along on the bottom. They jump up several points but promptly slip off again. It appears now that they are not going as low as they were. As a matter of fact, two-thirds of all prices seem to have definitely stabilized themselves or are up from the bottom. The others are not going any lower, and should in the normal course of events show some appreciation. If nothing unforeseen happens in the immediate future, this spring probably will see some permanent improvement in business. In other words, we have seen the worst. That we are going to bound forward again full tilt is unbelievable. The progress will have to be somewhat slow and steady. Considering, however, the severe test through which we have passed, it seems certain recovery will be more rapid than expected.

The brass business is showing signs of pick up. The mills look forward hopefully to increased business by spring. Advertising and increased sales promotion efforts are noticeable. Certainly those who go after the business most intensively are going to get it.

Aluminum business continues at the slightly improved pace mentioned last month. The use of aluminum for the spandrels on Radio City buildings means several thousand tons of metal.

Nickel is being taken in fair amount. The use of nickel alloy steels is increasing. Monel metal is also being taken in fair amount. The valuable technical data constantly being issued by The International Nickel Company greatly helps to make engineers and other users think in terms of Monel and nickel.

There is at present considerable metal buying "from hand-to-mouth"; lots of small orders. Soon these orders may be for larger amounts. Stocks in the hands of consumers are small.

# Daily Metal Prices for the Month of January, 1932

## Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

| | *1 | 4 | 5 | 6 | 7 | 8 | 11 | 12 | 13 | 14 | 15 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Copper** c/lb. Duty Free | | | | | | | | | | | | |
| Lake (Del.) | .... | 7.375 | 7.375 | 7.375 | 7.375 | 7.375 | 7.625 | 7.625 | 7.625 | 7.625 | 7.625 | 7.625 |
| Electrolytic (f.a.s. N. Y.) | .... | 7.25 | 7.25 | 7.25 | 7.25 | 7.25 | 7.50 | 7.375 | 7.375 | 7.375 | 7.375 | 7.375 |
| Casting (f.o.b. ref.) | .... | 6.875 | 6.875 | 6.875 | 6.875 | 7.00 | 7.25 | 7.25 | 7.25 | 7.25 | 7.25 | 7.25 |
| **Zinc** (f.o.b. St. L.) c/lb. Duty 1¾c/lb. | | | | | | | | | | | | |
| Prime Western | .... | 3.125 | 3.125 | 3.125 | 3.075 | 3.075 | 3.075 | 3.05 | 3.05 | 3.05 | 3.00 | 3.00 |
| Brass Special | .... | 3.225 | 3.225 | 3.225 | 3.175 | 3.175 | 3.175 | 3.15 | 3.15 | 3.15 | 3.10 | 3.10 |
| **Tin** (f.o.b. N. Y.) c/lb. Duty Free | | | | | | | | | | | | |
| Straits | .... | 21.125 | 20.75 | 21.125 | 21.75 | 21.875 | 21.80 | 22.00 | 21.70 | 22.00 | 22.375 | 22.20 |
| Pig 99% | .... | 20.70 | 20.30 | 20.625 | 21.25 | 21.375 | 21.375 | 21.50 | 21.25 | 21.50 | 21.75 | 21.70 |
| **Lead** (f.o.b. St. L.) c/lb. Duty 2⅛c/lb. | .... | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 |
| **Aluminum** c/lb. Duty 4c/lb | .... | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 |
| **Nickel** c/lb. Duty 3c/lb. | | | | | | | | | | | | |
| Ingot | .... | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| Shot | .... | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| Electrolytic | .... | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| **Antimony** (J. & Ch.) c/lb. Duty 2c/lb | .... | 6.15 | 6.15 | 6.15 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 |
| **Silver** c/oz. Troy Duty Free | .... | 30.25 | 30.25 | 29.625 | 29.75 | 30.125 | 29.875 | 30.00 | 29.875 | 30.375 | 30.25 | 29.50 |
| **Platinum** $/oz. Troy Duty Free | .... | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 |

| | 19 | 20 | 21 | 22 | 25 | 26 | 27 | 28 | 29 | High | Low | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Copper** c/lb. Duty Free | | | | | | | | | | | | |
| Lake (Del.) | 7.625 | 7.625 | 7.625 | 7.625 | 7.625 | 7.625 | 7.625 | 7.625 | 7.625 | 7.625 | 7.375 | 7.563 |
| Electrolytic (f.a.s. N. Y.) | 7.375 | 7.125 | 7.25 | 7.25 | 7.125 | 7.125 | 7.125 | 7.125 | 7.00 | 7.50 | 7.00 | 7.256 |
| Casting (f.o.b. ref.) | 7.125 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 6.75 | 6.75 | 6.75 | 7.25 | 6.75 | 7.019 |
| **Zinc** (f.o.b. St. L.) c/lb. Duty 1¾c/lb. | | | | | | | | | | | | |
| Prime Western | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 2.95 | 2.90 | 2.90 | 2.90 | 3.125 | 2.90 | 3.02 |
| Brass Special | 3.10 | 3.10 | 3.10 | 3.10 | 3.10 | 3.05 | 3.00 | 3.00 | 3.00 | 3.225 | 3.00 | 3.12 |
| **Tin** (f.o.b. N. Y.) c/lb. Duty Free | | | | | | | | | | | | |
| Straits | 22.10 | 22.25 | 22.25 | 21.90 | 21.85 | 22.25 | 22.00 | 21.80 | 21.70 | 22.375 | 20.75 | 21.84 |
| Pig 99% | 21.60 | 21.75 | 21.75 | 21.50 | 21.50 | 21.50 | 21.50 | 21.50 | 21.50 | 21.75 | 20.30 | 21.371 |
| **Lead** (f.o.b. St. L.) c/lb. Duty 2⅛c/lb. | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 | 3.55 |
| **Aluminum** c/lb. Duty 4c/lb | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 | 23.30 |
| **Nickel** c/lb. Duty 3c/lb. | | | | | | | | | | | | |
| Ingot | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| Shot | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| Electrolytic | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| **Antimony** (J. & Ch.) c/lb. Duty 2c/lb | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 5.95 | 5.95 | 5.95 | 5.95 | 6.15 | 5.95 | 6.013 |
| **Silver** c/oz. Troy Duty Free | 29.50 | 29.50 | 29.625 | 29.875 | 29.50 | 29.50 | 29.25 | 29.25 | 29.25 | 30.375 | 29.25 | 29.756 |
| **Platinum** $/oz. Troy Duty Free | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 | 37.50 |

*Holiday.

# Metal Prices, February 8, 1932

**(Duties mentioned refer to U. S. tariffs on imports, as given in the Tariff Act of 1930.)**

## NEW METALS

Copper: Lake, 6.875. Electrolytic, 6.25. Casting, 6.25.
Zinc: Prime Western, 2.85. Brass Special, 2.95.
Tin: Straits, 21.75. Pig, 99%, 21.375.
Lead: 3.55. **Aluminum,** 23.30. **Antimony,** 6.75.

**Nickel:** Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
**Quicksilver:** flask, 75 lbs., $66. **Bismuth,** 85.
**Cadmium,** 55. **Cobalt,** 97%, $2.50. **Silver, oz.,** Troy (N. Y. official price February 8), 29.625.
**Gold:** oz., Troy, $20.67. **Platinum,** oz., Troy, $37.50 to $40.00.

Duties: Copper, free; zinc, 1¾c. lb.; tin, free; lead, 2⅛c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

## INGOT METALS AND ALLOYS

| | Cents lb. | Duty |
|---|---|---|
| Brass Ingots, Yellow | 5½to 7 | 45% |
| Brass Ingots, Red | 7⅛to 8½ | 45% |
| Bronze Ingots | 7½to10 | 45% |
| Casting Aluminum Alloys | 19 to22 | 4c. lb. |
| Manganese Bronze Castings | 18 to35 | 45% |
| Manganese Bronze Ingots | 6¾to11 | 45% |
| Manganese Bronze Forgings | 26 to35 | 45% |
| Manganese Copper, 30% | 17 to25 | 25% |
| Monel Metal Shot or Blocks | 28 | 25% |
| Phosphor Bronze Ingots | 8¼to11 | 45% |
| Phosphor Copper, guaranteed 15% | 11 to15 | 3c. lb. |
| Phosphor Copper, guaranteed 10% | 10½to14½ | 3c. lb. |
| Phosphor Tin, no guarantee | 28 to40 | Free |
| Silicon Copper, 10% | 17 to35 | 45% |
| Iridium Platinum, 5% | $42.00 | Free |
| Iridium Platinum, 10% | $44.00 | Free |

## OLD METALS

| Dealers' buying prices, wholesale quantities | Cents lb. | Duty |
|---|---|---|
| Heavy copper and wire, mixed | 4⅝to 4⅞ | Free |
| Light Copper | 4 to 4¼ | Free |
| Heavy yellow brass | 2⅜to 2⅝ | Free |
| Light brass | 2 to 2¼ | Free |
| No. 1 Composition | 3¾to 4 | Free |
| Composition turnings | 3½to 3¾ | Free |
| Heavy Soft lead | 2¾to 2⅞ | 2⅛c. lb. |
| Old Zinc | 1 to 1⅛ | 1½c. lb. |
| New zinc clips | 1½to 1¾ | 1½c. lb. |
| Aluminum clips (new, soft) | 11 to12 | 4c. lb. |
| Scrap aluminum, cast, mixed | 3½to 4 | 4c. lb. |
| Scrap aluminum sheet (old) | 8½to 9 | 4c. lb. |
| No. 1 pewter | 12½to13½ | Free |
| Electrotype and Linotype | 2⅝to 3⅛ | 2⅛c. lb.* |
| Nickel anodes | 21 to22 | 10% |
| Nickel sheet clips; rod ends (new) | 23 to24 | 10% |
| Monel scrap | 5¾to 8½ | 3c. lb. |

* On lead content.

# Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, small quantity, packing, etc., as shown in manufacturers' price lists, effective January 11, 1932.

## COPPER MATERIAL

| | Net base per lb. | Duty |
|---|---|---|
| Sheet, hot rolled | 16⅝c. | 2⅛c. lb. |
| Bare wire | 9¼c. | 25% |
| Seamless tubing | 16⅛c. | 7c. lb. |
| Soldering coppers | 17⅛c. | 45% |

## NICKEL SILVER (NICKELENE)

Net base prices per lb. (Duty 30% ad valorem.)

| Grade "A" Sheet Metal | | Wire and Rod | |
|---|---|---|---|
| 10% Quality | 21⅞c. | 10% Quality | 25 c. |
| 15% Quality | 24⅛c. | 15% Quality | 29 c. |
| 18% Quality | 25⅜c. | 18% Quality | 32½c. |

## BRASS MATERIAL—MILL SHIPMENTS

Net base prices per pound

| Net per lb. | High Brass | Low Brass | Bronze | Duty |
|---|---|---|---|---|
| Sheet | 13⅜c. | 14⅝c. | 15¼c. | 4c. lb. |
| Wire | 13⅜c. | 14⅝c. | 15¼c. | 25% |
| Rod | 11⅛c. | 14⅝c. | 15¼c. | 4c. lb. |
| Brazed tubing | 22½c. | | 25⅞c. | 12c. lb. |
| Open seam tubing | 21⅛c. | | 23 c. | 25% |
| Angles, channels | 21⅛c. | | 23 c. | 12c. lb. |
| Seamless tubing | 16⅝c. | | 18⅜c. | 8c. lb. |

## TOBIN BRONZE AND MUNTZ METAL

Net base prices per pound. (Duty 4c. lb.)

| | |
|---|---|
| Tobin Bronze Rod | 14⅞c. |
| Muntz or Yellow Metal Sheathing (14"x18") | 15½c. |
| Muntz or Yellow Rectangular sheet other sheathing | 15½c. |
| Muntz or Yellow Metal Rod | 12⅛c. |

## ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

| | |
|---|---|
| Aluminum sheet, 18 ga., base, ton lots, per lb. | 32.30 |
| Aluminum coils, 24 ga., base price | 30.00 |

## ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

| | | | |
|---|---|---|---|
| Cold Drawn Rods | 50c. | Cold Rolled Sheet | 60c. |
| Hot Rolled Rods | 45c. | Full Finished Sheet | 52c. |

## MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

| | | | |
|---|---|---|---|
| Hot Rolled Rods (base) | 35 | Full Finished Sheets (base) | 42 |
| Cold Drawn Rods (base) | 40 | Cold Rolled Sheets (base) | 50 |

## SILVER SHEET

Rolled sterling silver (February 8) 32.75c. per Troy oz. upward, according to quantity. (Duty free.)

## ZINC AND LEAD SHEET

| | Cents per lb. Net Base | Duty |
|---|---|---|
| Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount | 9.00 | 2c. lb. |
| Zinc sheet, full casks (jobbers' price) | 9.25 | 2c. lb. |
| Zinc sheet, open casks (jobbers' price) | 10.00to10.25 | 2c. lb. |
| Full Lead Sheet (base price) | 7.00 | 2⅜c. lb. |
| Cut Lead Sheet (base price) | 7.25 | 2⅜c. lb. |

## BLOCK TIN AND BRITANNIA METAL SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

| | |
|---|---|
| 500 lbs or over | 15c. above N. Y. pig tin price |
| 100 to 500 lbs. | 17c. above N. Y. pig tin price |
| Up to 100 lbs. | 25c. above N. Y. pig tin price |

**Lighter gauges command "extras" over the above prices**

# Supply Prices, February 8, 1932

## ANODES

| | | |
|---|---|---|
| **Copper:** Cast | 18⅝c. | per lb. |
| Rolled, sheets, trimmed | 17½c. | per lb. |
| Rolled, oval | 15⅜c. | per lb. |
| **Brass:** Cast | 18⅜c. | per lb. |
| **Zinc:** Cast | 10½c. | per lb. |
| **Nickel:** 90-92% | 40c. to 45c. | per lb. |
| 95-97% | 41c. to 46c. | per lb. |
| 99% | 43c. to 48c. | per lb. |

**Silver:** Rolled silver anodes .999 fine were quoted February 8 from 32.75c., per Troy ounce upward, depending upon quantity.

## FELT POLISHING WHEELS WHITE SPANISH

| Diameter | Thickness | Under 50 lbs. | 50 to 100 lbs. | Over 100 lbs. |
|---|---|---|---|---|
| 10-12-14 & 16 | 1" to 2" | $3.00/lb. | $2.75/lb. | $2.65/lb. |
| 10-12-14 & 16 | 2 to 3½ | 3.00 | 2.70 | 2.50 |
| 6-8 & over 16 | 1 to 3½ | 3.10 | 2.85 | 2.70-2.75 |
| 6 to 24 | Under ½ | 4.25 | 4.00 | 3.90 |
| 6 to 24 | ½ to 1 | 4.00 | 3.75 | 3.65 |
| 6 to 24 | Over 3 | 3.40 | 3.15 | 3.05 |
| 4 to 6 | ¼ to 3 | 4.85 | 4.85 | 4.85 |
| 4 to 6 | Over 3 | 5.25 | 5.25 | 5.25 |
| Under 4 | ¼ to 3 | 5.45 | 5.45 | 5.45 |
| Under 4 | Over 3 | 5.85 | 5.85 | 5.85 |

On grey Mexican wheels deduct 10c. per lb. from White Spanish.

## COTTON BUFFS

Full disc open buffs, per 100 sections, when purchased in lots of 100 or less:

| | |
|---|---|
| 11" 20 ply 64/68 Unbleached | $13.37 to $14.85 |
| 14" 20 ply 64/68 Unbleached | 21.60 to 23.70 |
| 11" 20 ply 80/92 Unbleached | 17.00 to 18.38 |
| 14" 20 ply 80/92 Unbleached | 26.37 to 28.00 |
| 11" 20 ply 84/92 Unbleached | 21.69 to 21.90 |
| 14" 20 ply 84/92 Unbleached | 35.37 to 36.15 |
| 11" 20 ply 80/84 Unbleached | 21.69 to 21.90 |
| 14" 20 ply 80/84 Unbleached | 35.37 to 36.15 |

Sewed Pieced Buffs, per lb., bleached ............ 41c. to 70c.

## CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

| | | |
|---|---|---|
| Acetone | lb. | .09¾-.14 |
| Acid—Boric (Boracic) Powdered | lb. | .08⅛-.09½ |
| Chromic, 75 to 400 lb. drums | lb. | .14 -.17½ |
| Hydrochloric (Muriatic) Tech., 20 deg., carboys | lb. | .02 |
| Hydrochloric, C. P., 20 deg., carboys | lb. | .06 |
| Hydrofluoric, 30%, bbls. | lb. | .08 |
| Nitric, 36 deg., carboys | lb. | .06-.06½ |
| Nitric, 42 deg., carboys | lb. | .07-.08 |
| Sulphuric, 66 deg., carboys | lb. | .02 |
| Alcohol—Butyl | lb. | 14.30-21.70 |
| Denatured drums | gal. | .35½-.43½ |
| Alum—Lump, barrels | lb. | .03¼-.04 |
| Powdered, barrels | lb. | .03½-.04 |
| Ammonia, agua, 26 deg., drums, carboys | lb. | .03½-.05 |
| Ammonium sulphate, tech., bbls | lb. | .03½-.05 |
| Sulphocyanide | lb. | .28-.37 |
| Arsenic, white, kegs | lb. | .04½-.05 |
| Asphaltum | lb. | .35 |
| Benzol, pure | gal. | .58 |
| Borax Crystals (Sodium Biborate), bbls. | lb. | .04½ |
| Cadmium oxide, 50 to 1,000 lbs. | lb. | .55 |
| Calcium Carbonate (Precipitated Chalk) | lb. | .05¾-.07½ |
| Carbon Bisulphide, drums | lb. | .05½-.08 |
| Chrome Green, bbls. | lb. | .20 |
| Chromic Sulphate | lb. | .30-.40 |
| Copper—Acetate (Verdigris) | lb. | .30-.33 |
| Carbonate, bbls. | lb. | .14-.20 |
| Cyanide (100 lb. kgs.) | lb. | .39 |
| Sulphate, bbls. | lb. | .038-.05¼ |
| Cream of Tartar Crystals (Potassium Bitartrate) | lb. | .20¼-.20½ |
| Crocus | lb. | .15 |
| Dextrin | lb. | .05-.08 |
| Emery Flour | lb. | .06 |
| Flint, powdered | ton | $30.00 |
| Fluor-spar, bags | lbs. | .04½ |
| Gold Chloride | oz. | $12.00 |
| Gum—Sandarac | lb. | .26 |
| Shellac | lb. | .59-.61 |
| Iron Sulphate (Copperas), bbls. | lb. | .01½ |
| Lacquer Solvents | gal. | .85 |
| Lead Acetate (Sugar of Lead) | lb. | .13¼ |
| Yellow Oxide (Litharge) | lb. | .12½ |
| Mercury Bichloride (Corrosive Sublimate) | lb. | $1.58 |
| Methanol, 100% synth., drums | gal. | .41½ |
| Nickel—Carbonate, dry bbls. | lb. | .32 |
| Chloride, bbls. | lb. | .18-.19½ |
| Salts, single, 300 lb. bbls. | lb. | .10½-.13 |
| Salts, double, 425 lb. bbls | lb. | .10½-.13 |
| Paraffin | lb. | .05-.06 |
| Phosphorus—Duty free, according to quantity | lb. | .35-.40 |
| Potash Caustic Electrolytic 88-92% broken, drums | lb. | .06¾-.08½ |
| Potassium Bichromate, casks (crystals) | lb. | .08½ |
| Carbonate, 96-98% | lb. | .06¾ |
| Cyanide, 165 lbs. cases, 94-96% | lb. | .50-.60 |
| Pumice, ground, bbls. | lb. | .02½ |
| Quartz, powdered | ton | $30.00 |
| Rosin, bbls. | lb. | .04½ |
| Rouge, nickel, 100 lb. lots | lb. | .25 |
| Silver and Gold | lb. | .65 |
| Sal Ammoniac (Ammonium Chloride) in bbls | lb. | .04½-.05¾ |
| Silver Chloride, dry, 100 oz. lots | oz. | .26¾-.27 |
| Cyanide (fluctuating) | oz. | .34¼-.40 |
| Nitrate, 100 ounce lots | oz. | .23¼-.23½ |
| Soda Ash, 58%, bbls. | lb. | .023 |
| Sodium—Cyanide, 96 to 98%, 100 lbs. | lb. | .16½-.22 |
| Hyposulphite, kegs, bbls. | lb. | .03½.-06½ |
| Metasilicate | lb. | .05-.06¼ |
| Nitrate, tech., bbls. | lb. | .03¼-.07 |
| Phosphate, tech., bbls. | lb. | .03¾ |
| Silicate (Water Glass), bbls | lb. | .01½ |
| Stannate | lb. | .21½ |
| Sulphocyanide | lb. | .28-.45 |
| Sulphur (Brimstone), bbls. | lb. | .02 |
| Tin Chloride, 100 lb. kegs | lb. | .25½-.27 |
| Tripoli, powdered | lb. | .03 |
| Wax—Bees, white, ref. bleached | lb. | .60 |
| Yellow, No. 1 | lb. | .45 |
| Whiting, Bolted | lb. | .02½-.06 |
| Zinc, Carbonate, bbls. | lb. | .11 |
| Chloride, drums, bbls. | lb. | .07½-.10 |
| Cyanide (100 lb. kegs) | lb. | .38 |
| Sulphate, bbls. | lb. | .03½ |